Figures

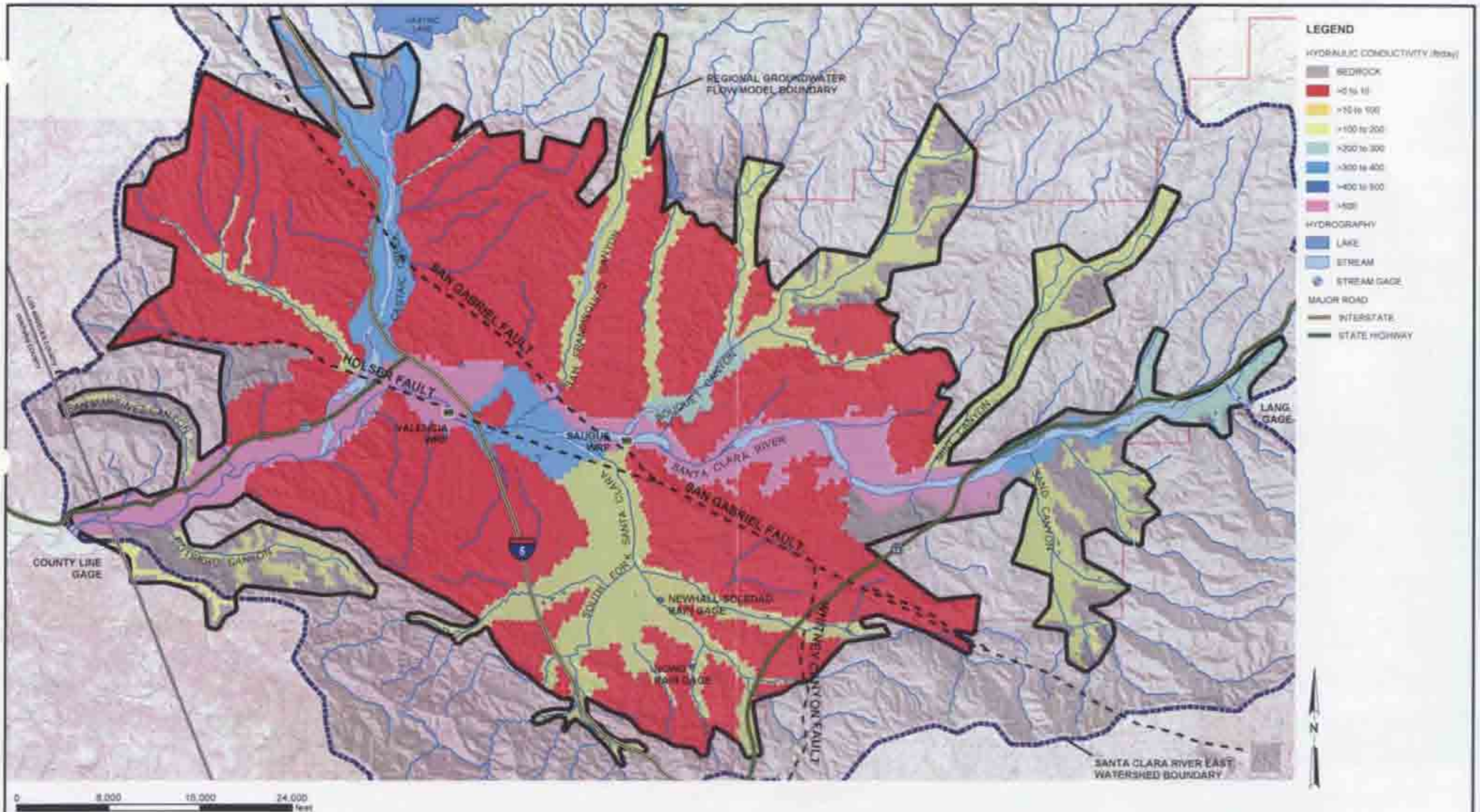

FIGURE 5-1
HYDRAULIC CONDUCTIVITY LAYER 1
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

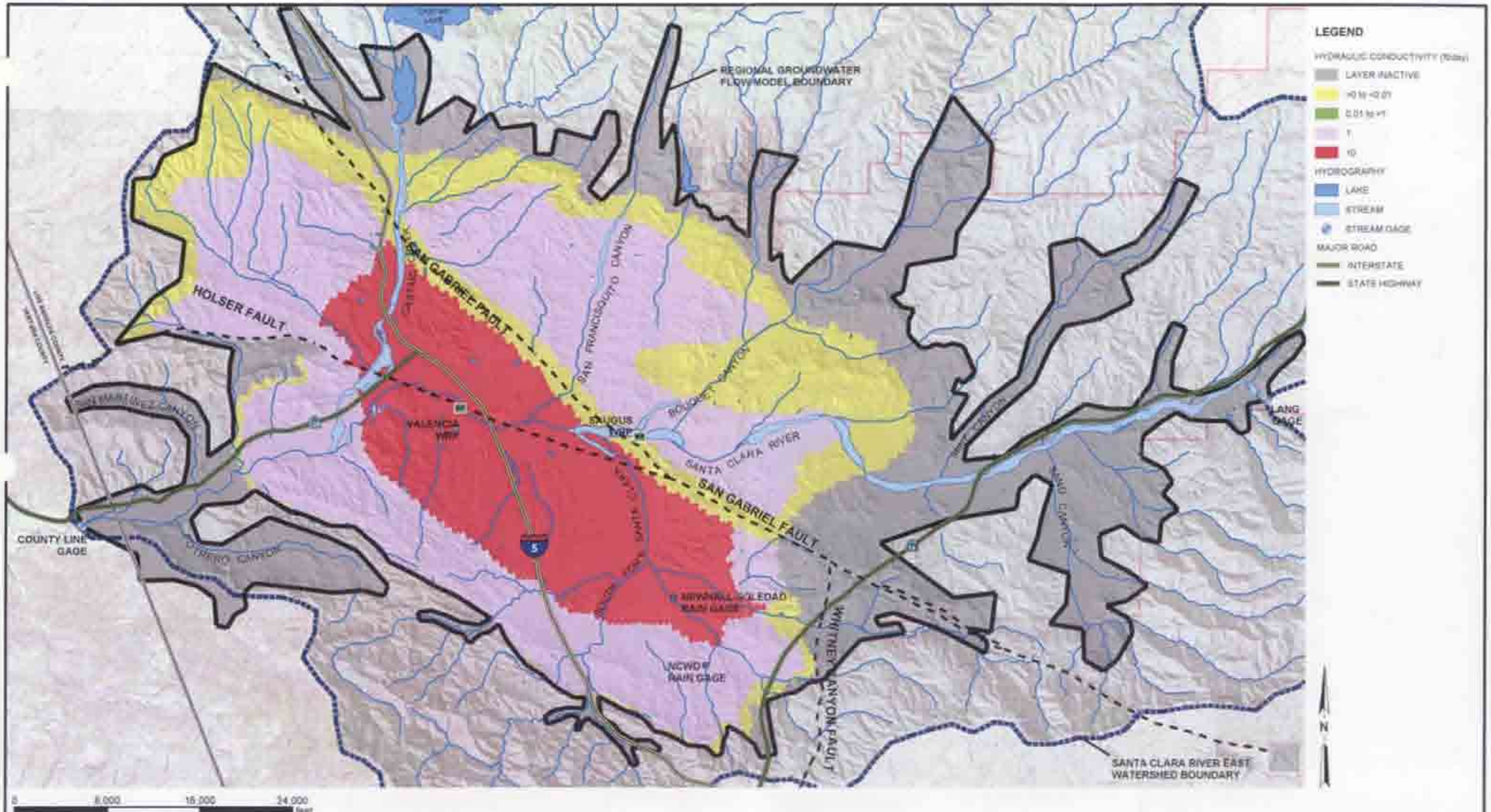

FIGURE 5-2
HYDRAULIC CONDUCTIVITY LAYER 2
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

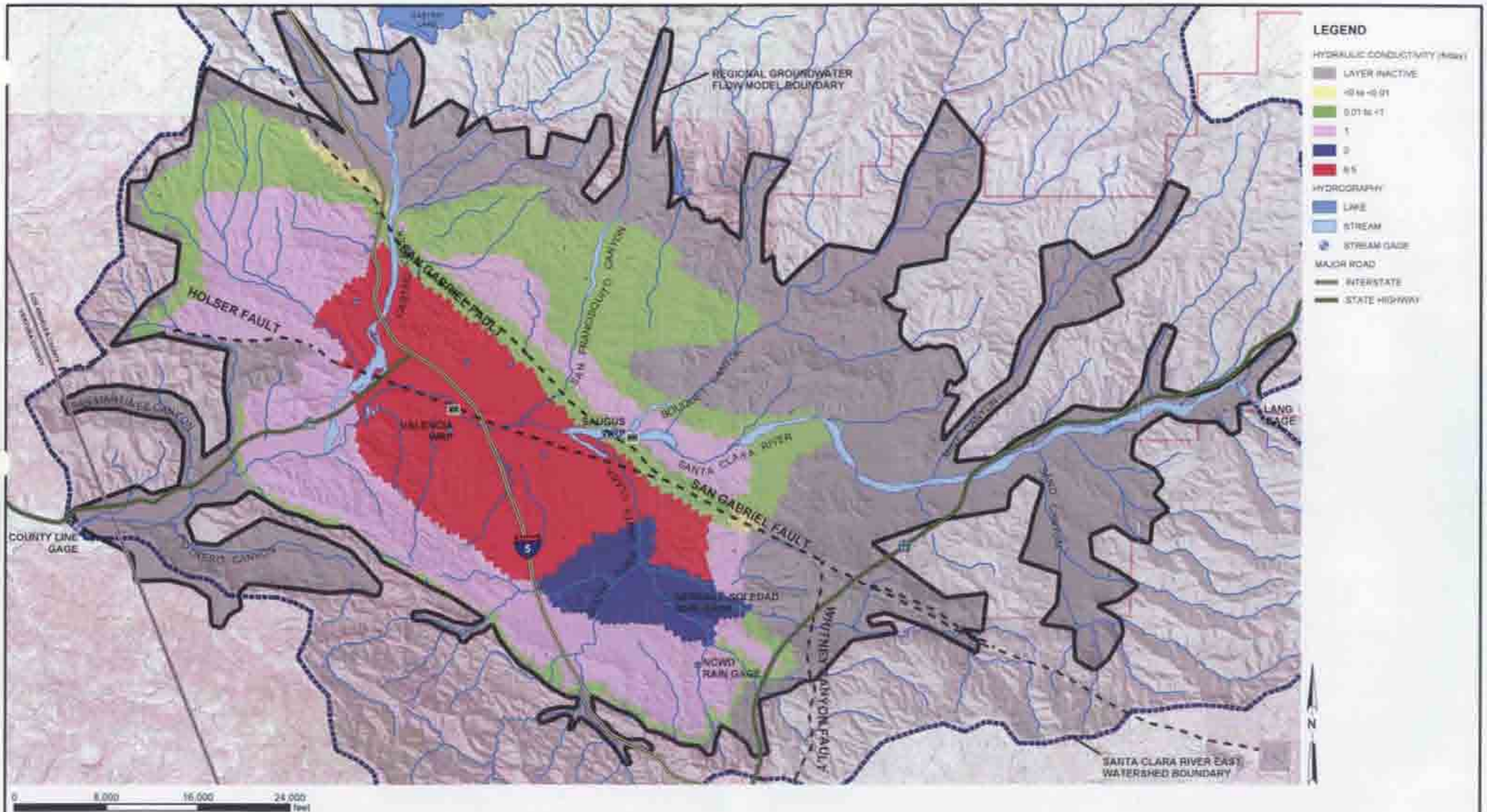

FIGURE 5-3
HYDRAULIC CONDUCTIVITY LAYER 3
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

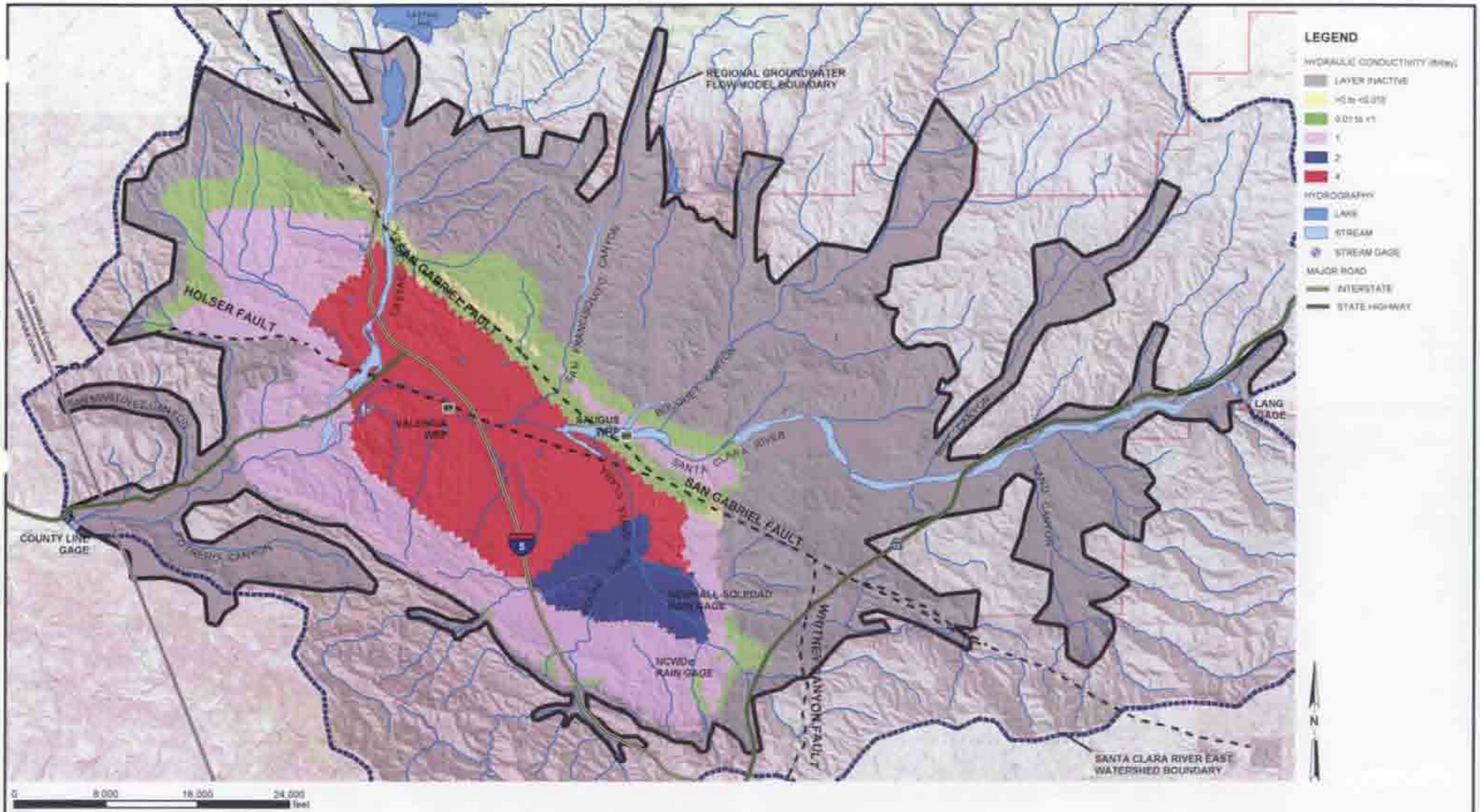

FIGURE 5-4
HYDRAULIC CONDUCTIVITY LAYER 4
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

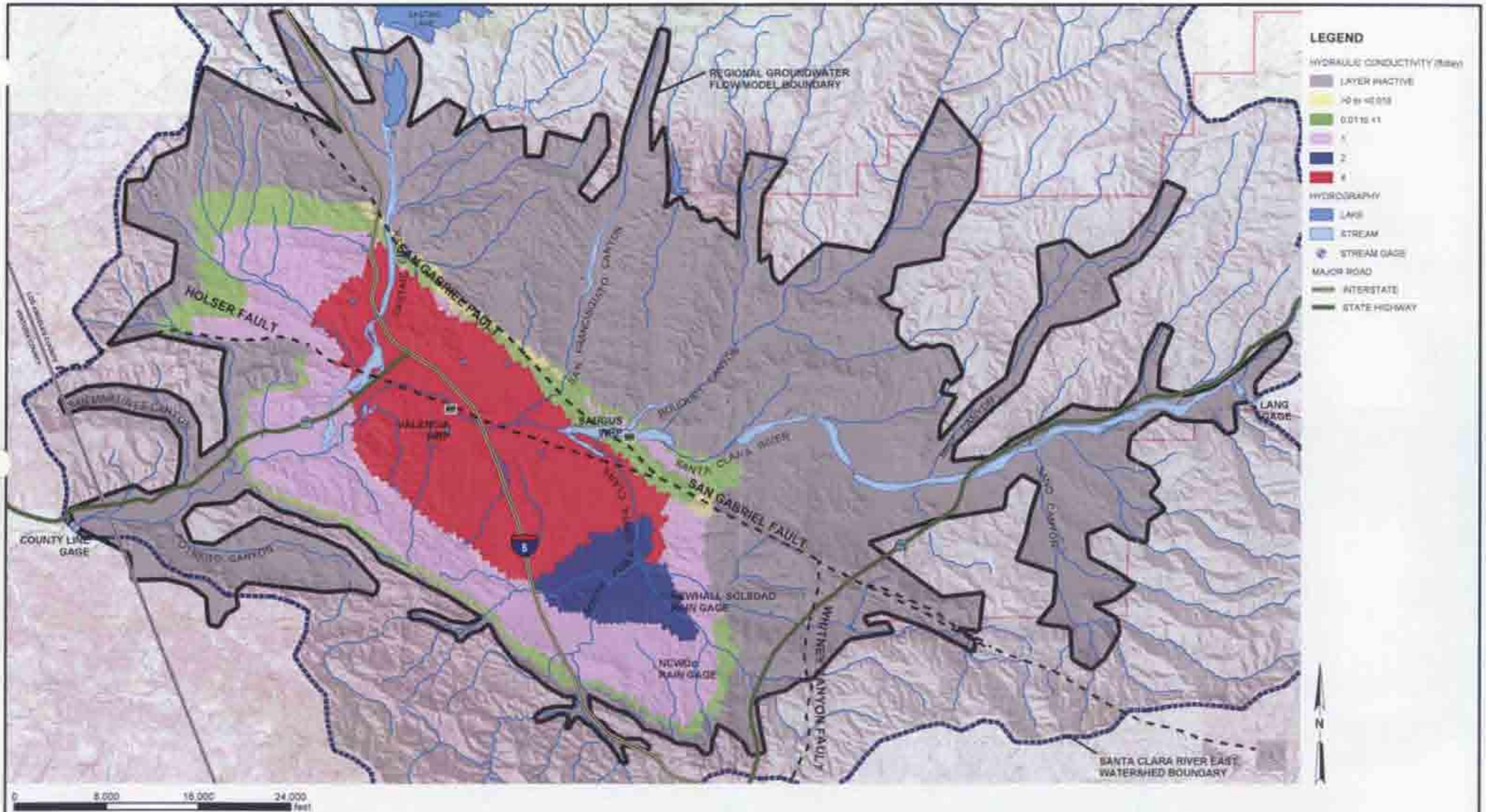

FIGURE 5-5
HYDRAULIC CONDUCTIVITY LAYER 5
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

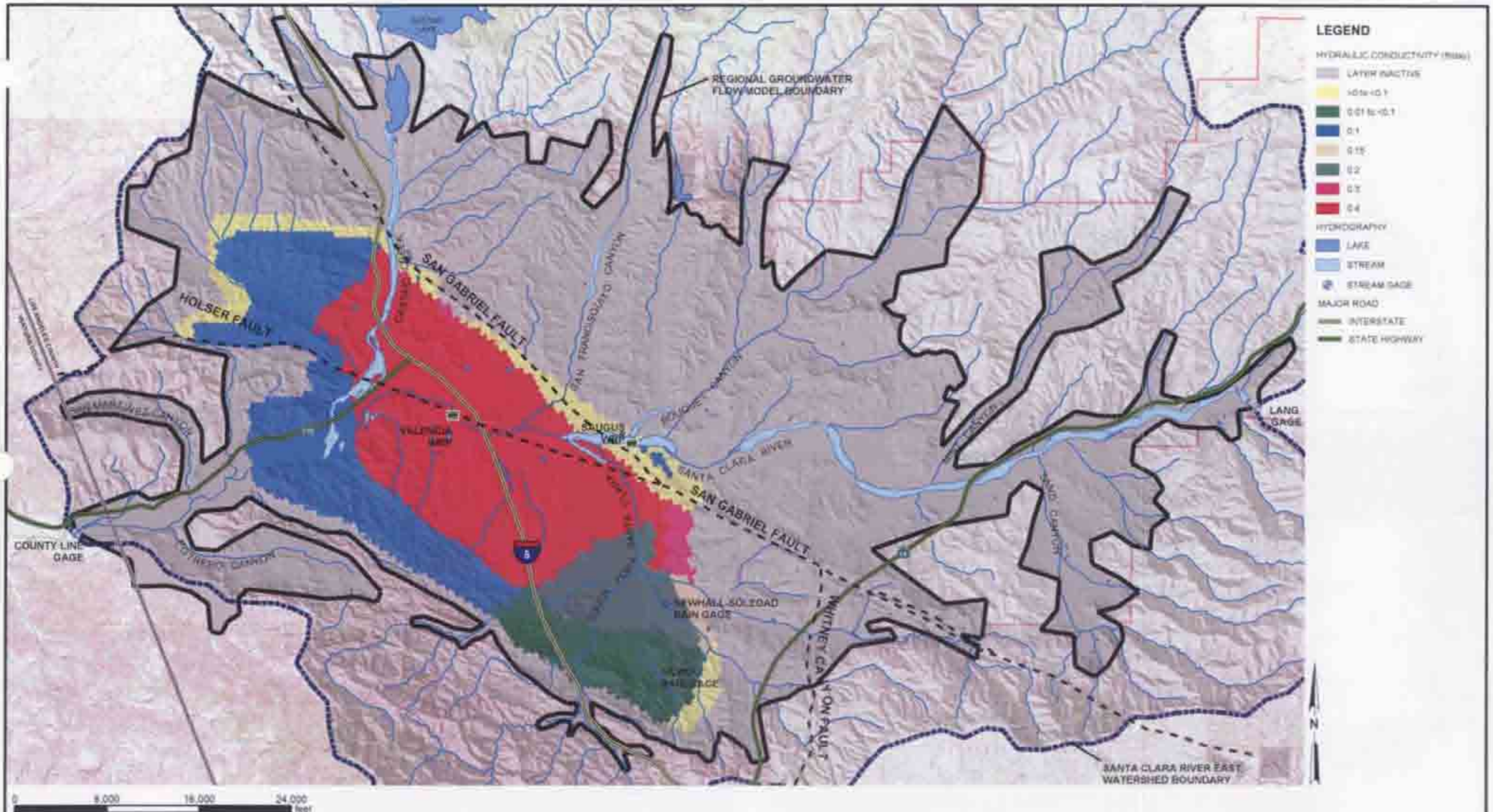

FIGURE 5-6
HYDRAULIC CONDUCTIVITY LAYER 6
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

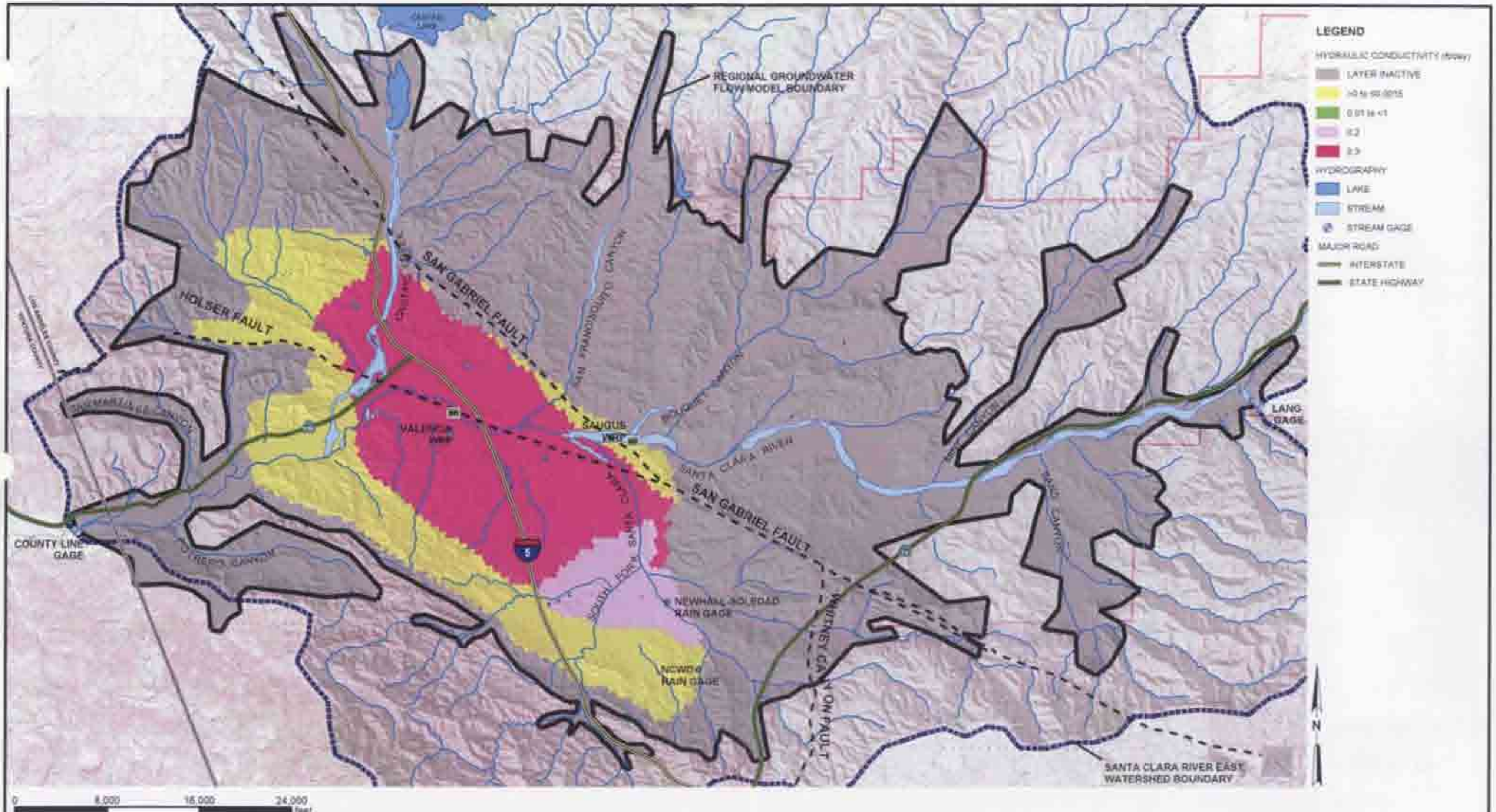

FIGURE 5-7
HYDRAULIC CONDUCTIVITY LAYER 7
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

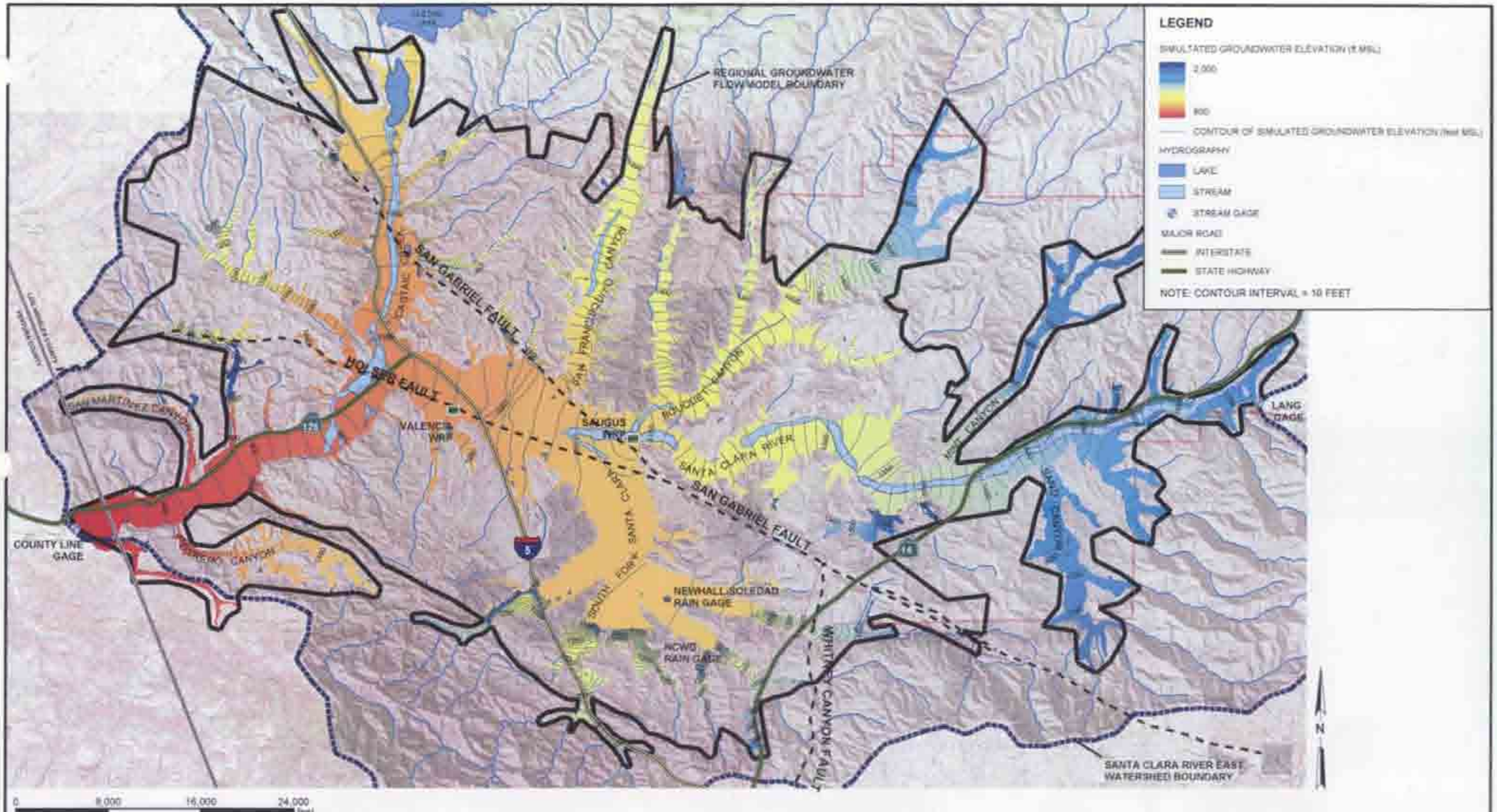

FIGURE 5-8
STEADY-STATE 1980-1985 GROUNDWATER ELEVATION CONTOURS FOR ALLUVIAL AQUIFER

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ\SS\SANTACLARITA_MOU\FIGURES\MXD\FIG5-8.MXD FIG05-8.PDF 02/03/2004 08:46:47

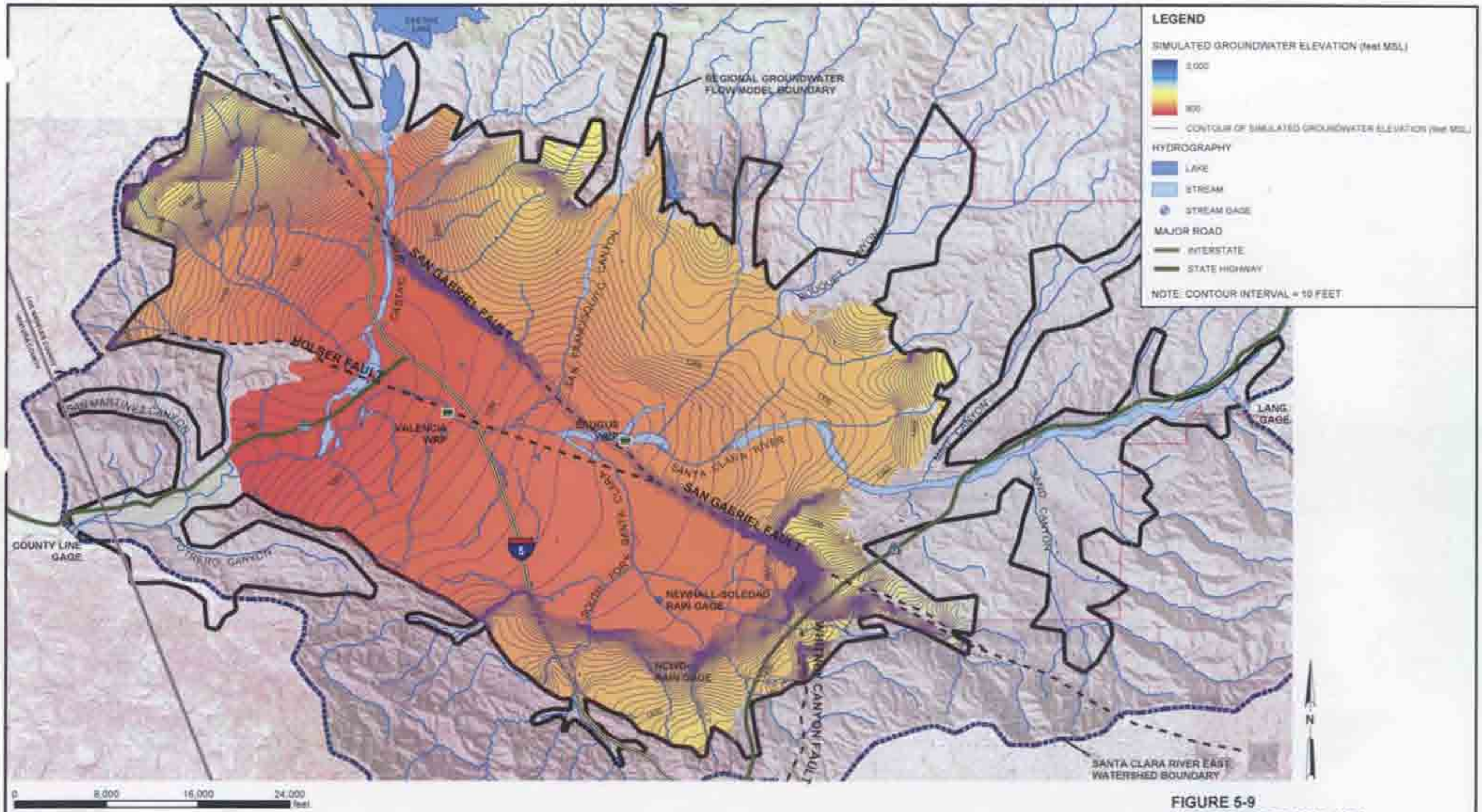

FIGURE 5-9
STEADY-STATE 1980-1985 GROUNDWATER ELEVATION CONTOURS FOR SAUGUS FORMATION IN MODEL LAYER 2
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ\SS\SANTACLARITA_MOU\FIGURES\MXD\FIG046.MXD FIG05-9.PDF 02/02/2004 10:58:01

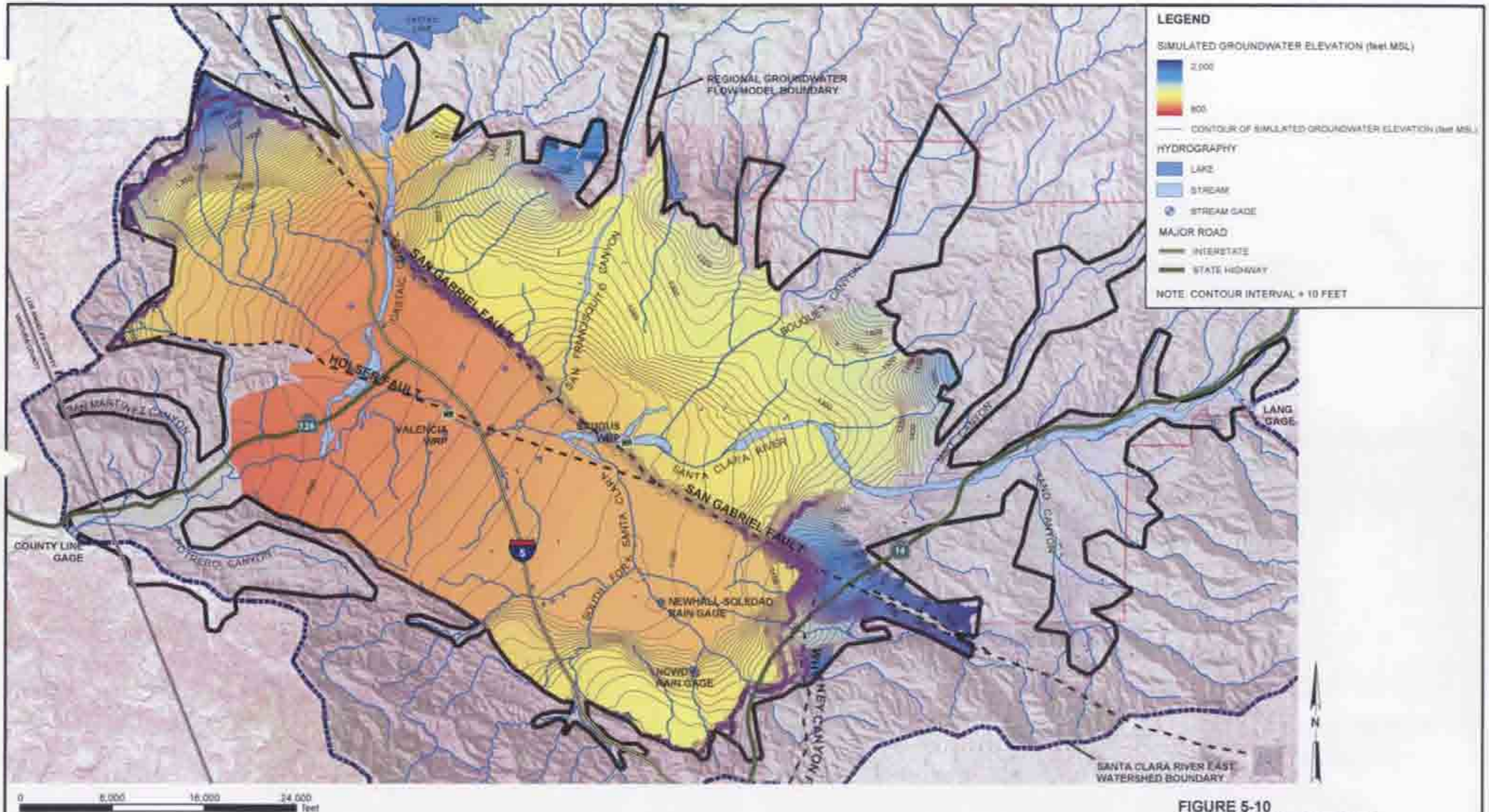

FIGURE 5-10
STEADY-STATE 1980-1985
GROUNDWATER ELEVATION
CONTOURS FOR SAUGUS FORMATION
IN MODEL LAYER 3
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

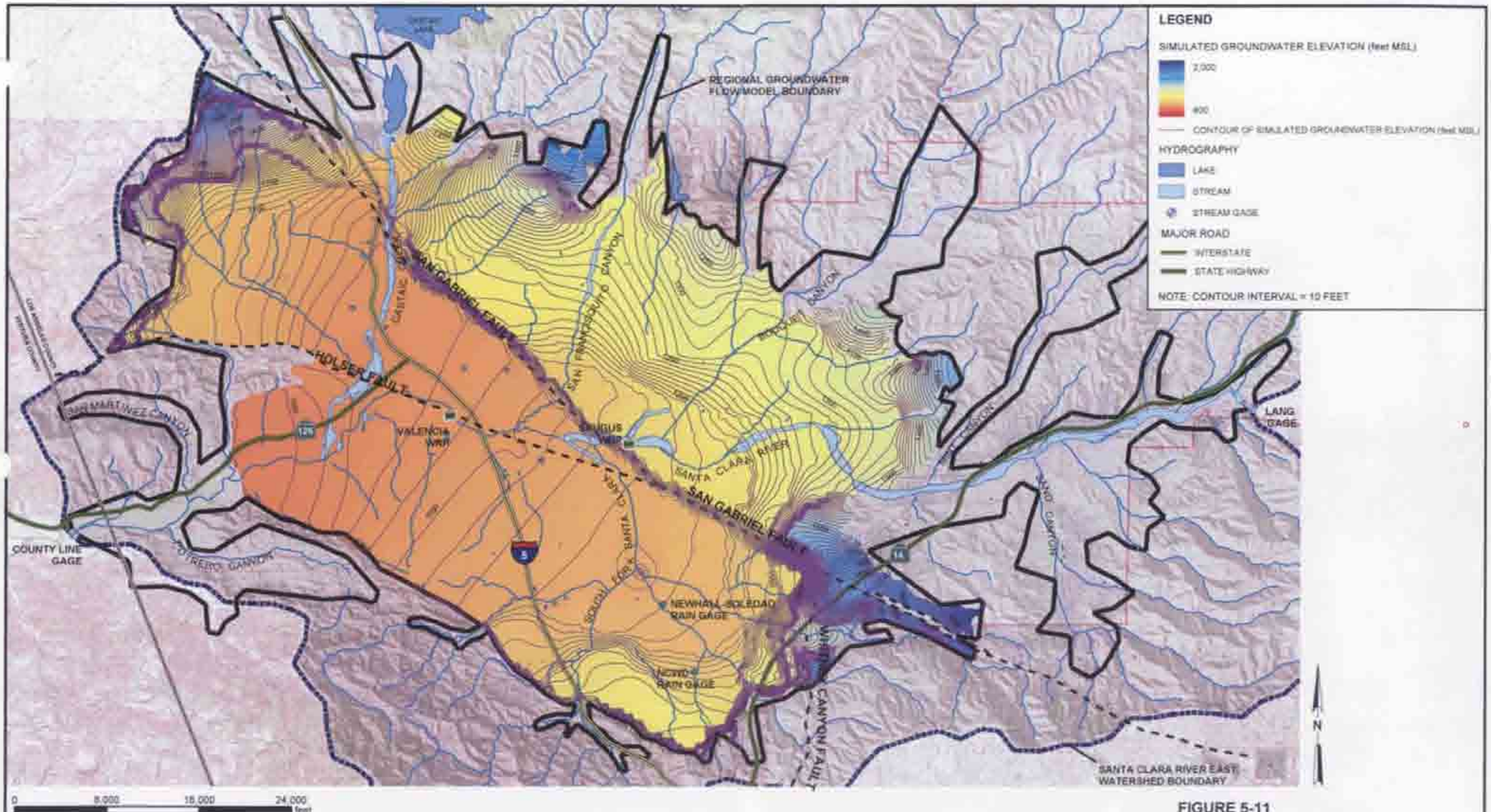

FIGURE 5-11
STEADY-STATE 1980-1985 GROUNDWATER ELEVATION CONTOURS FOR SAUGUS FORMATION IN MODEL LAYER 4
REGIONAL GROUNDWATER FLOW MODEL FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\OOIN\PROJ\SS\SANTACLARITA_MOU\FIGURES\MXD\FIG047.MXD FIG05-11.PDF 02/02/2004 10:07:23

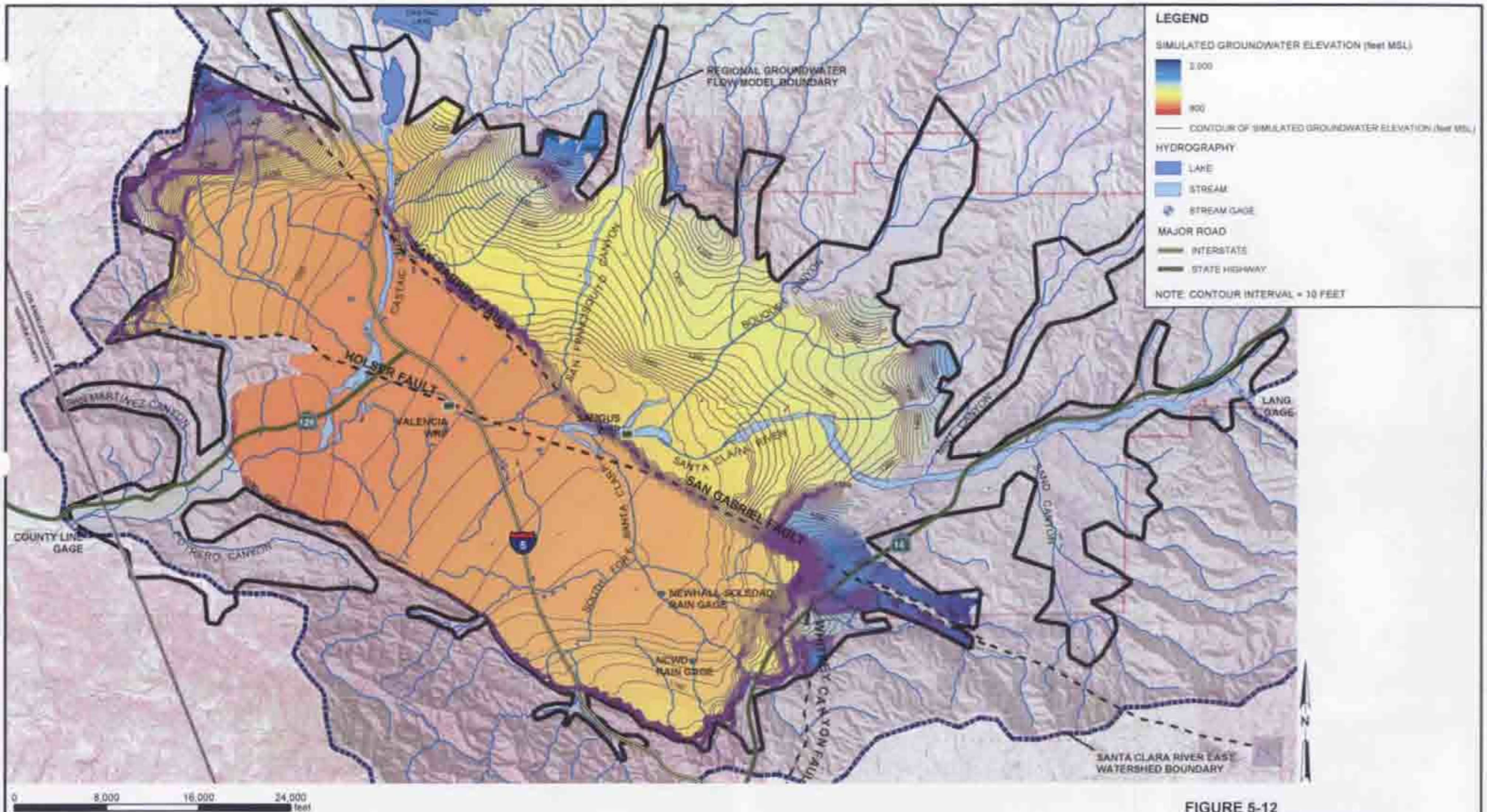

FIGURE 5-12
STEADY-STATE 1980-1985 GROUNDWATER ELEVATION CONTOURS FOR SAUGUS FORMATION IN MODEL LAYER 5

REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ2-55\SANTACLARITA_MOU\FIGURES\MXD\FIG048.MXD FIG05-12.PDF 02/02/2004 11:04:40

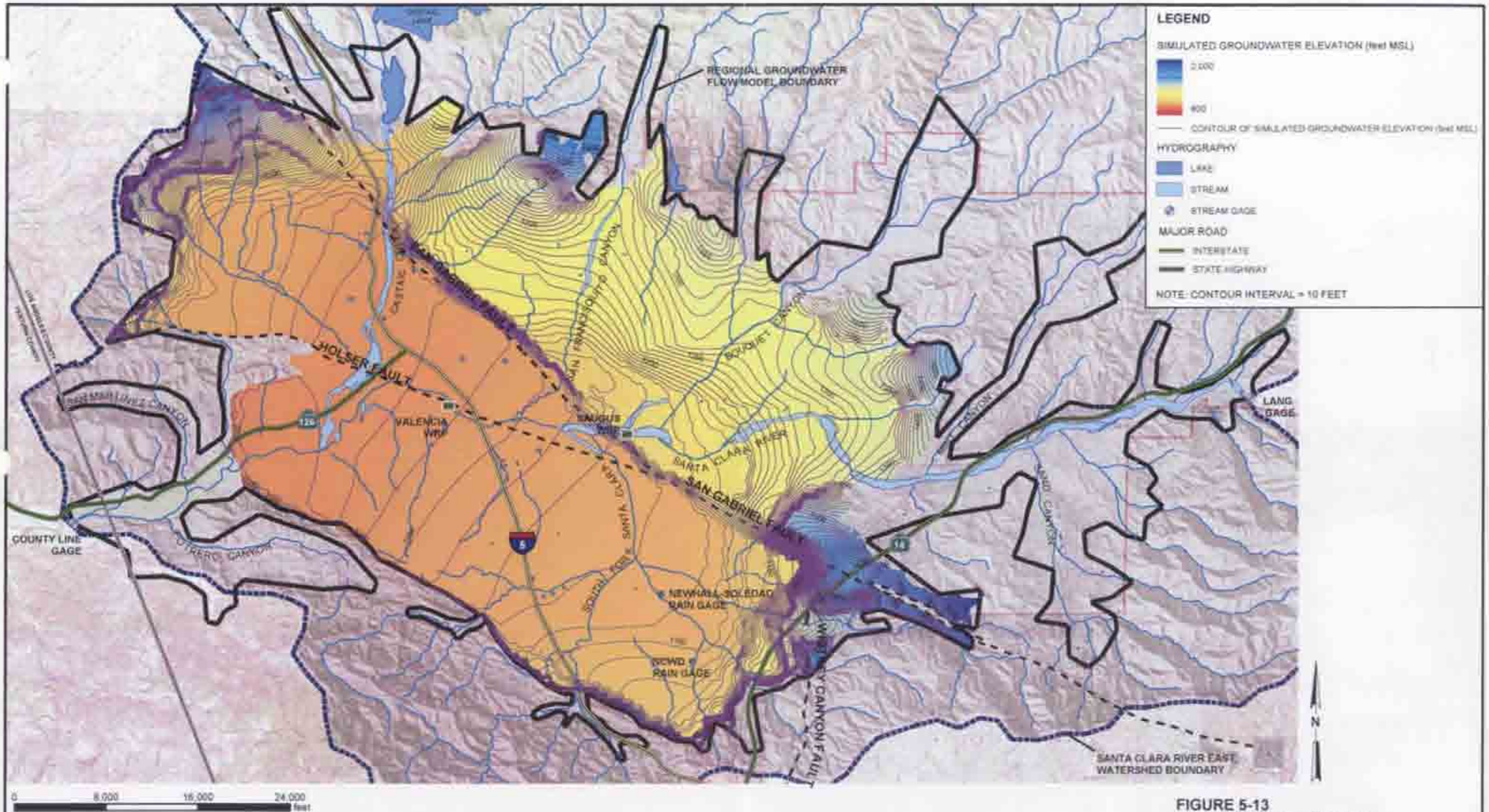

FIGURE 5-13
STEADY-STATE 1980-1985 GROUNDWATER ELEVATION CONTOURS FOR SAUGUS FORMATION IN MODEL LAYER 6

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ\155\SANTACLARITA_MOU\FIGURES\MXD\FIG061.MXD FIG05-13.PDF 02/02/2004 11:11:08

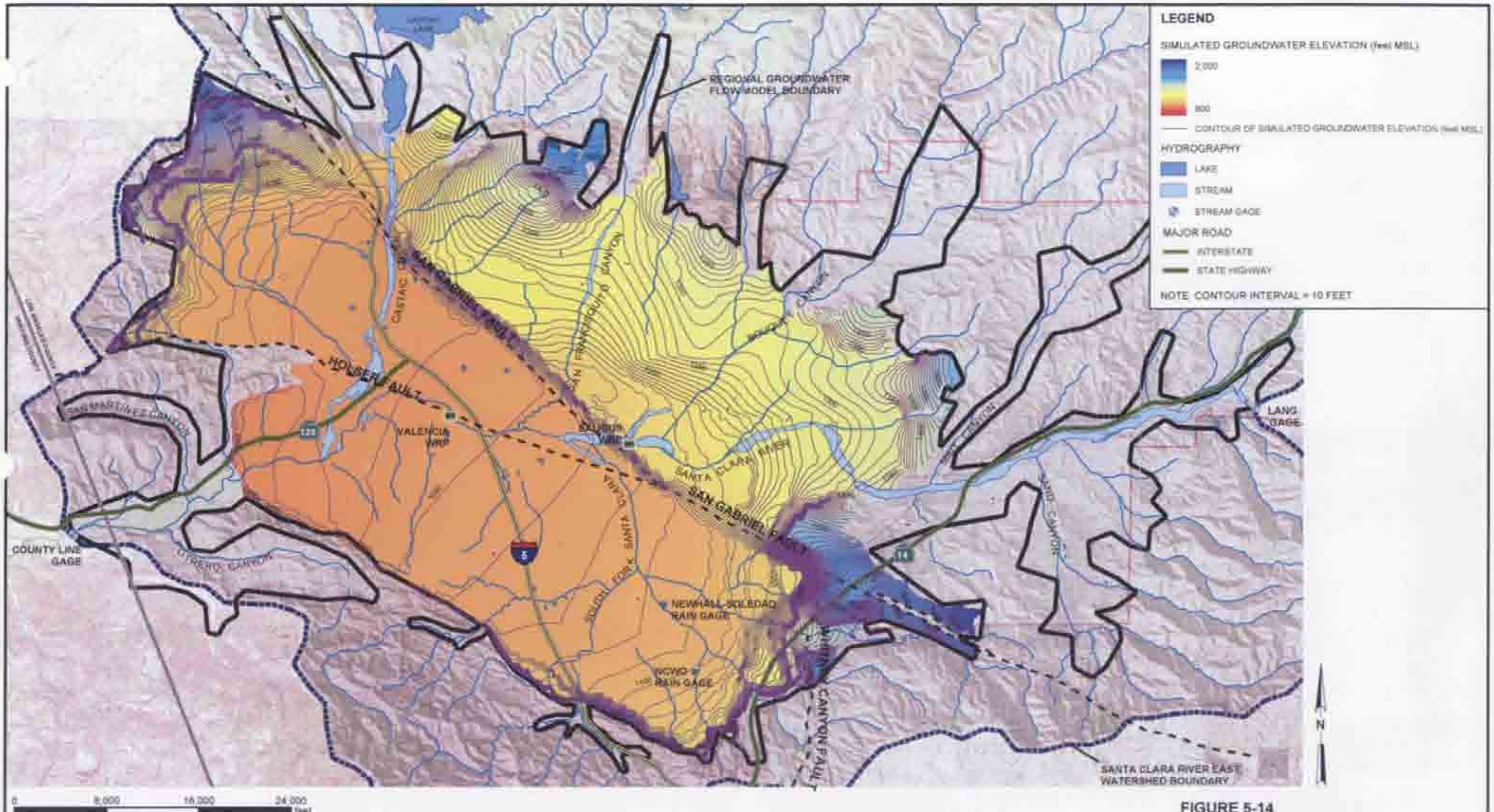

FIGURE 5-14
STEADY-STATE 1980-1985 GROUNDWATER ELEVATION CONTOURS FOR SAUGUS FORMATION IN MODEL LAYER 7
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

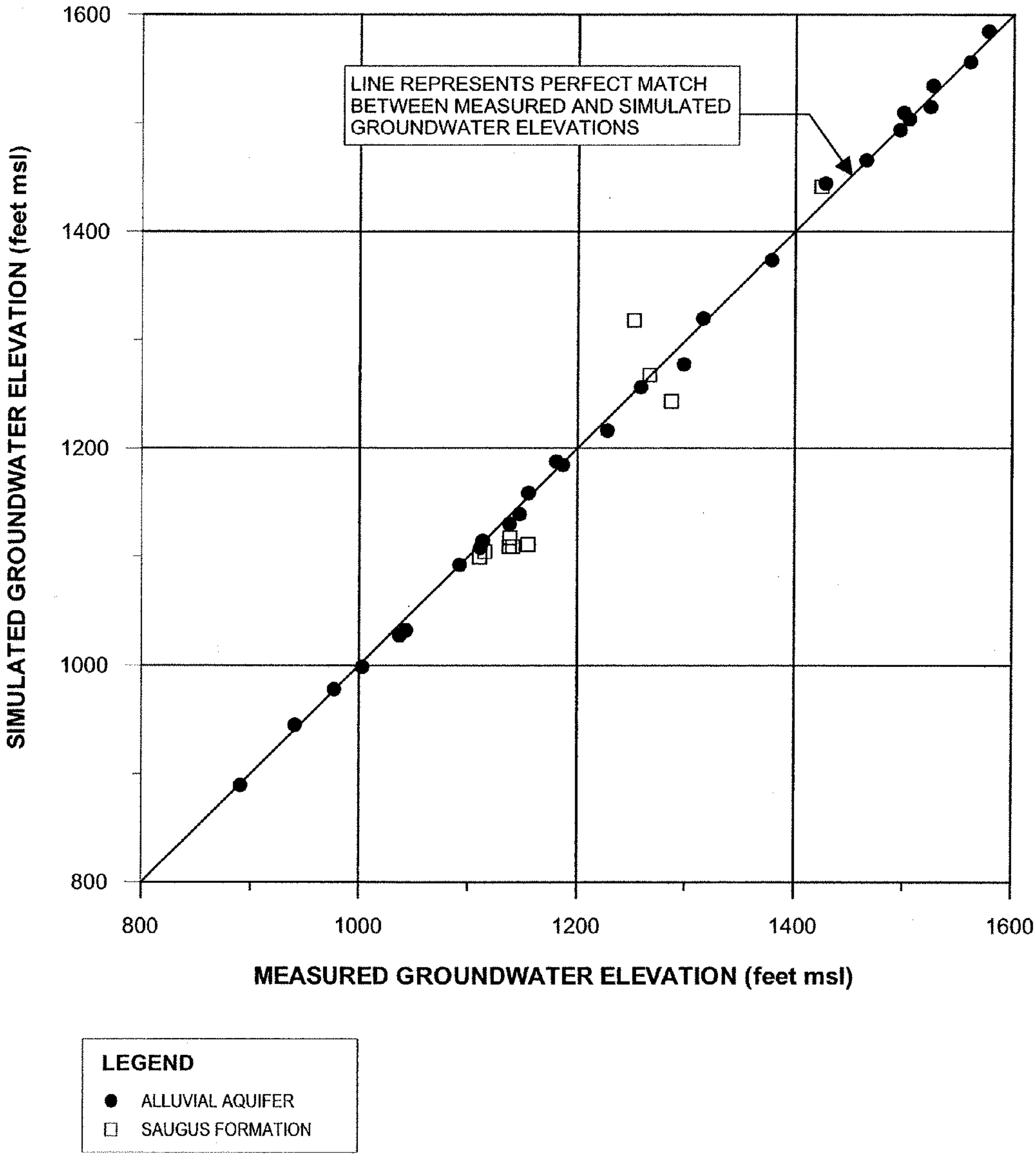

FIGURE 5-15
SIMULATED VERSUS MEASURED GROUNDWATER ELEVATIONS FOR THE STEADY-STATE MODEL
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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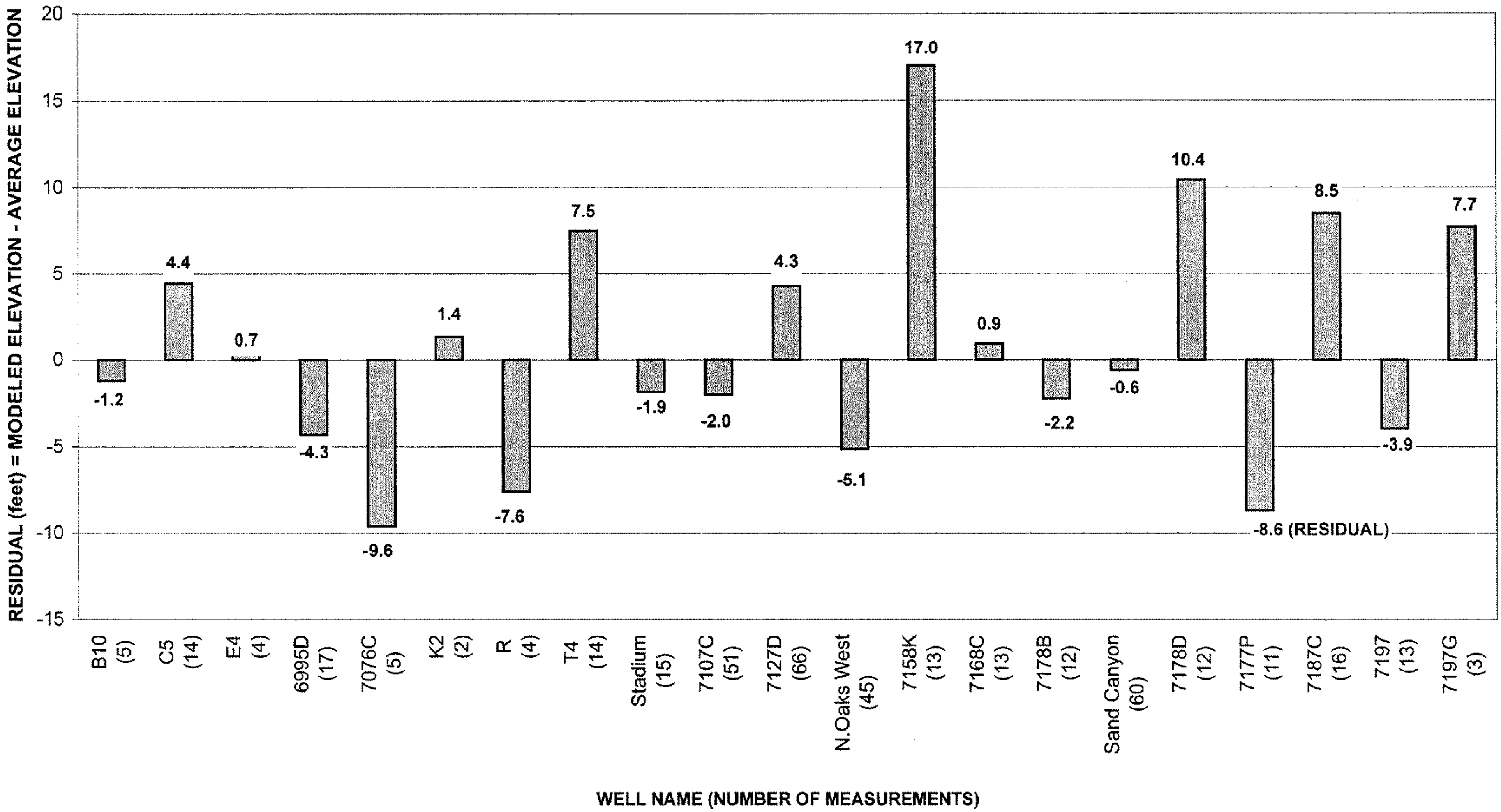


FIGURE 5-16
STEADY-STATE MODEL ERROR FOR ALLUVIAL AQUIFER TARGET WELLS ALONG THE SANTA CLARA RIVER
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-403.xls/Fig 5-16

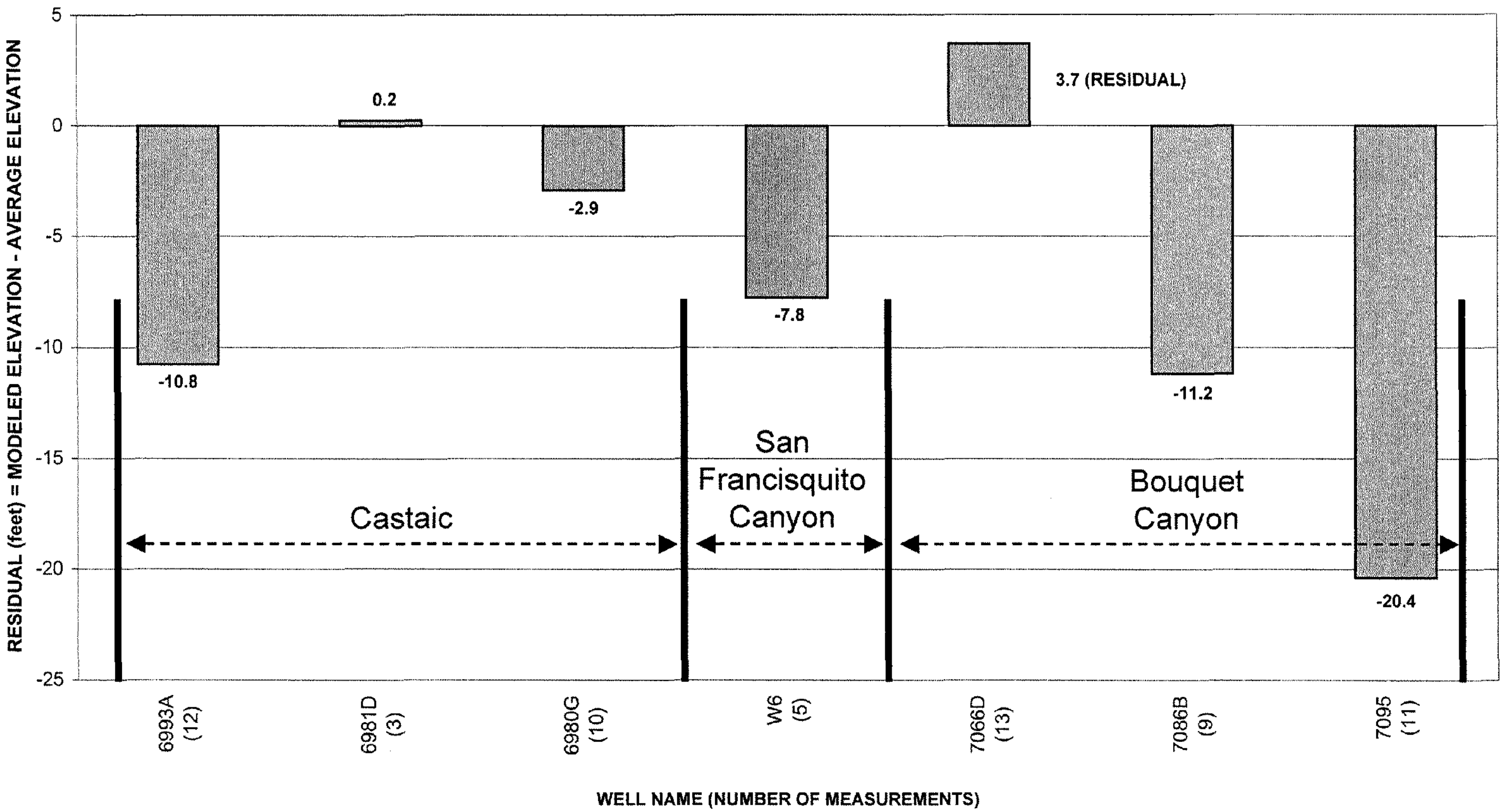
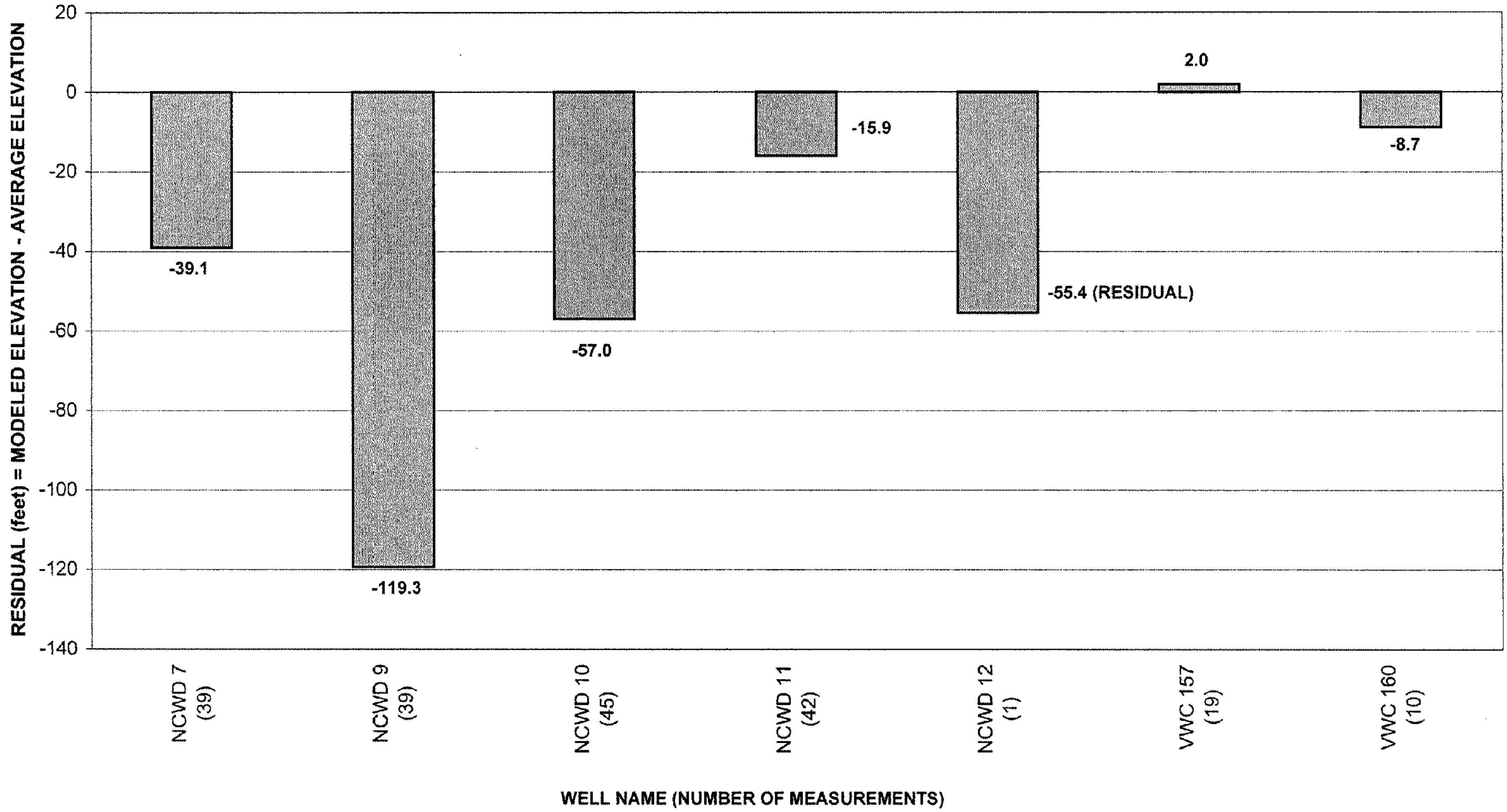


FIGURE 5-17
STEADY-STATE MODEL ERROR FOR ALLUVIAL AQUIFER TARGET WELLS AWAY FROM THE SANTA CLARA RIVER
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-403.xls/Fig 5-17



NOTE:
ALL WELLS SHOWN ON THIS PLOT ARE LOCATED IN THE SOUTH FORK SANTA CLARA RIVER VALLEY

FIGURE 5-18
STEADY-STATE MODEL ERROR FOR SAUGUS FORMATION PRODUCTION WELLS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

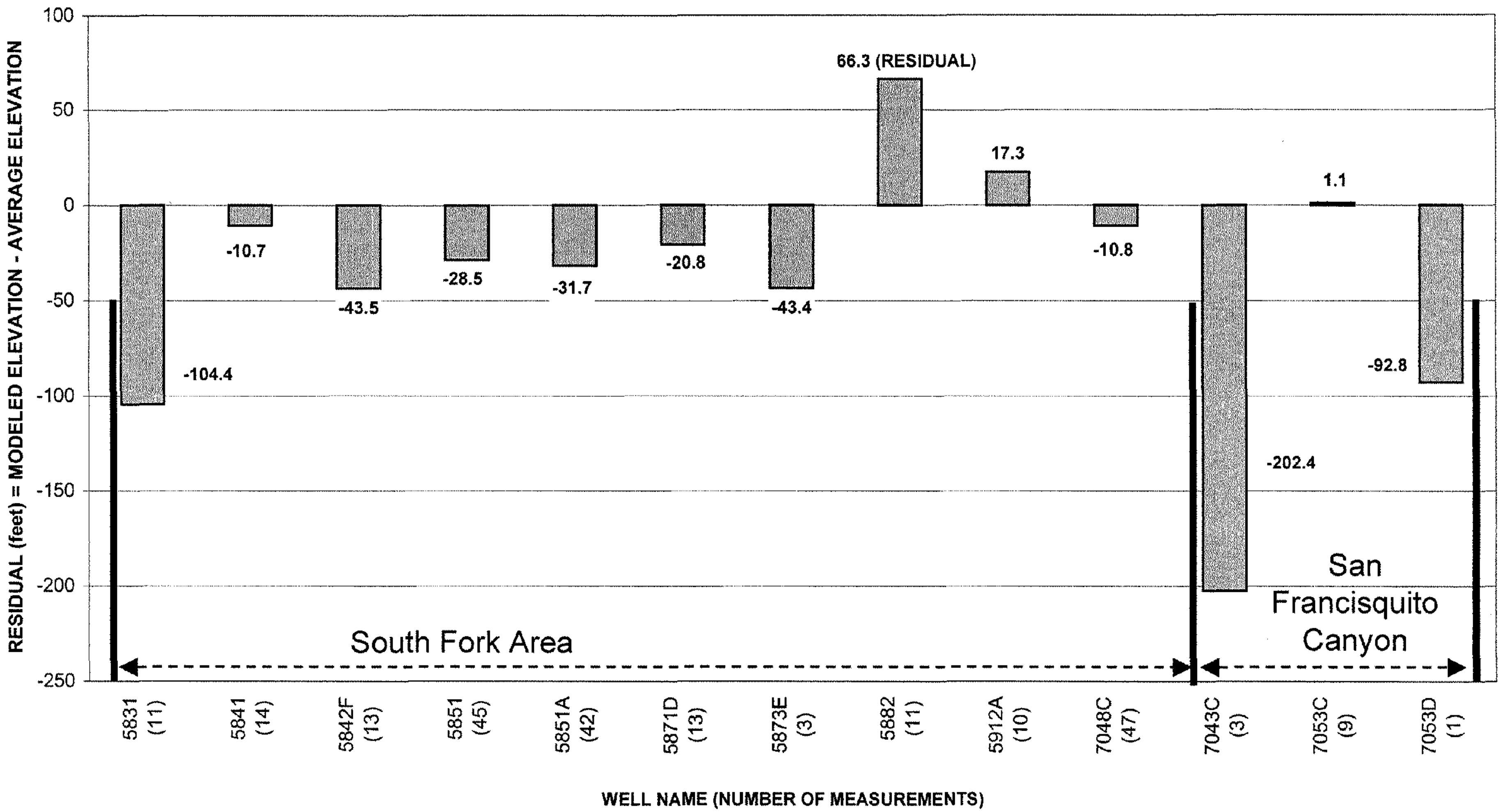
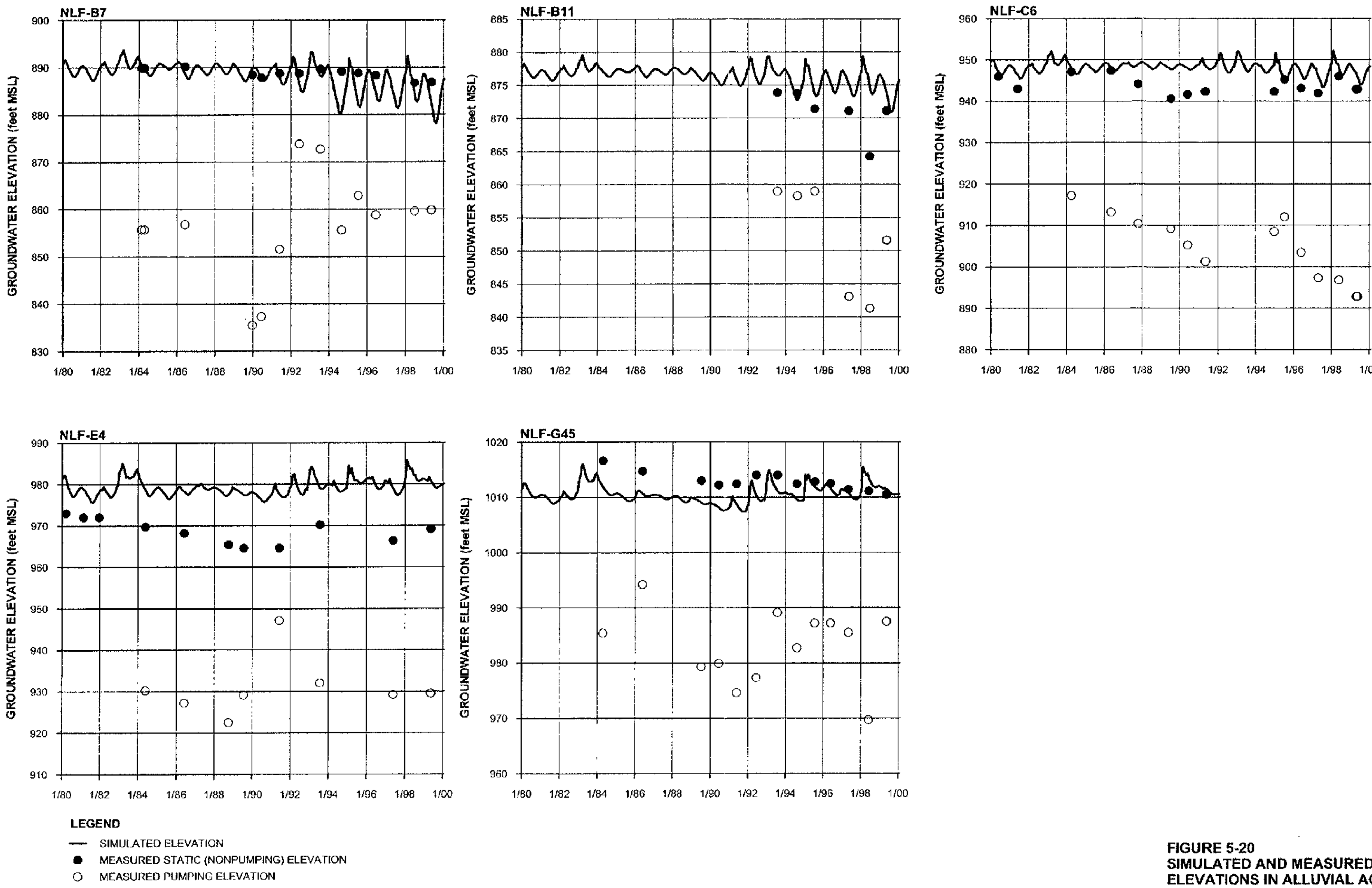


FIGURE 5-19
STEADY-STATE MODEL ERROR FOR SAUGUS FORMATION OBSERVATION WELLS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



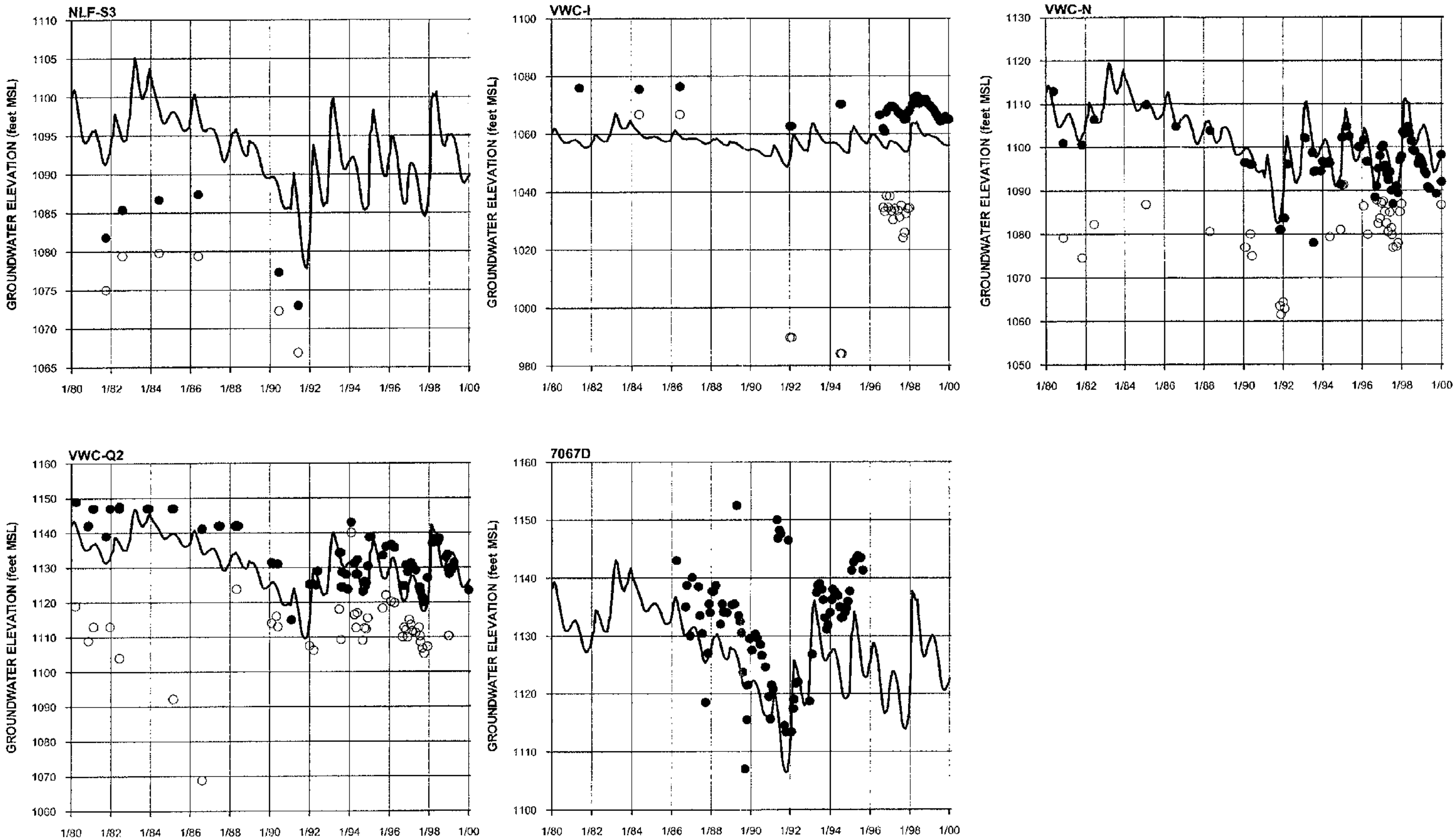
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

FIGURE 5-20
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN ALLUVIAL AQUIFER WELLS WEST OF INTERSTATE 5

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

175670-310.GRF



LEGEND

— SIMULATED ELEVATION
● MEASURED STATIC (NONPUMPING) ELEVATION
○ MEASURED PUMPING ELEVATION

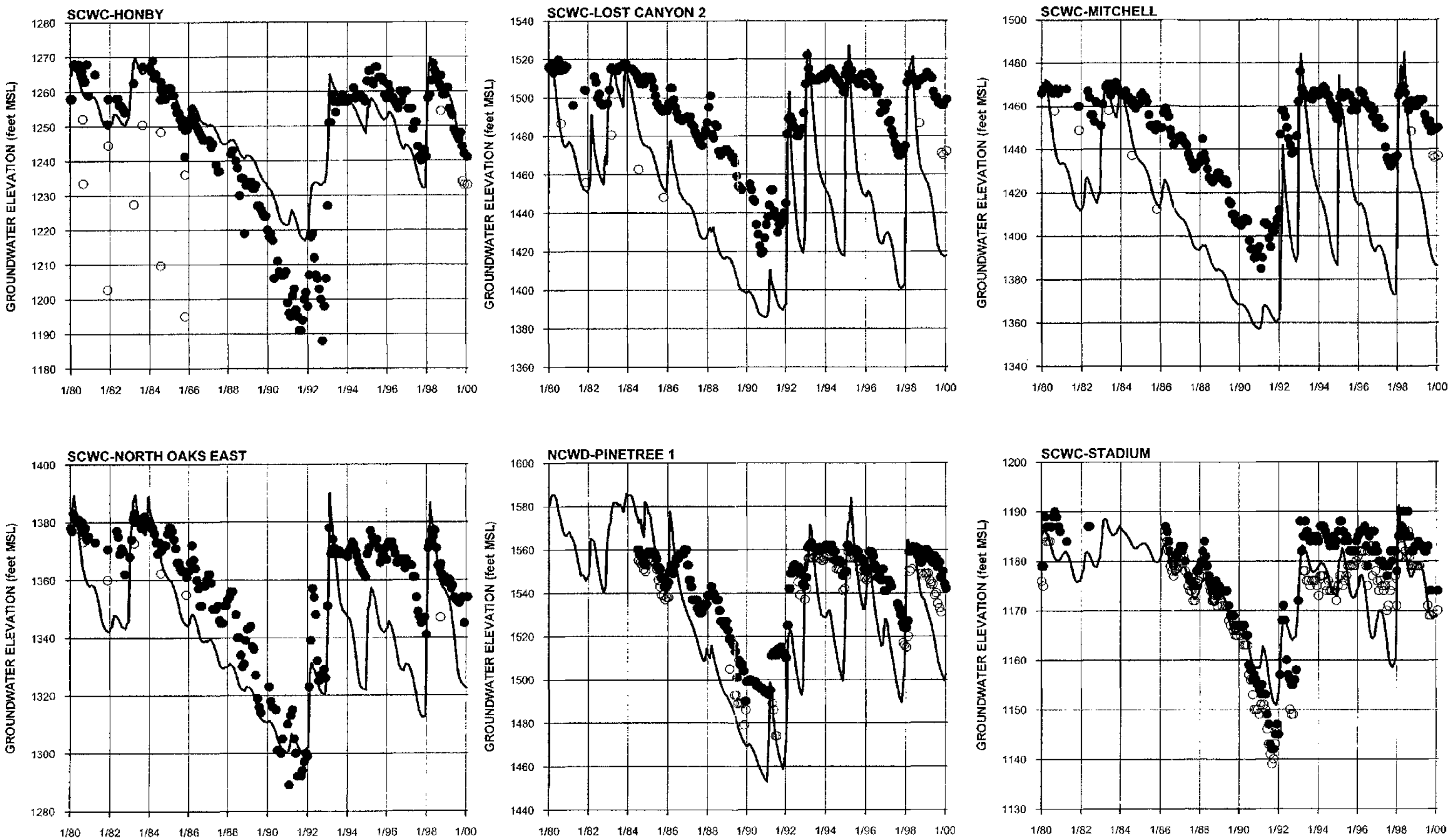
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

FIGURE 5-21
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN ALLUVIAL AQUIFER WELLS BETWEEN INTERSTATE 5 AND SOLEDAD CANYON

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

175570-312.GRF



LEGEND

— SIMULATED ELEVATION

● MEASURED STATIC (NONPUMPING) ELEVATION

○ MEASURED PUMPING ELEVATION

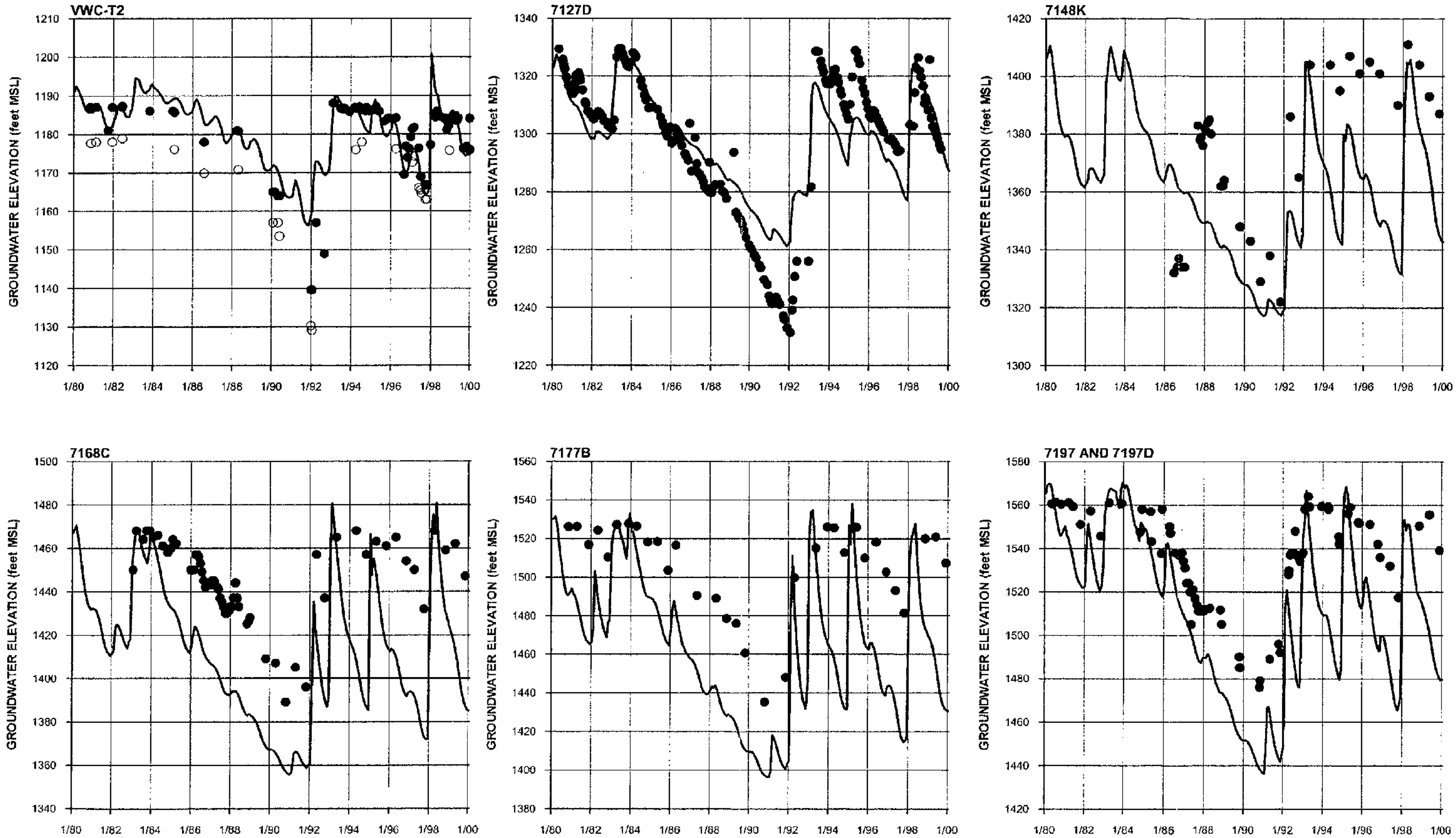
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

FIGURE 5-22
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN ALLUVIAL AQUIFER WELLS IN SOLEDAD CANYON (PAGE 1 OF 2)

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

178973-313.GRF

CH2MHILL



LEGEND

- SIMULATED ELEVATION
- ● MEASURED STATIC (NONPUMPING) ELEVATION
- ○ MEASURED PUMPING ELEVATION

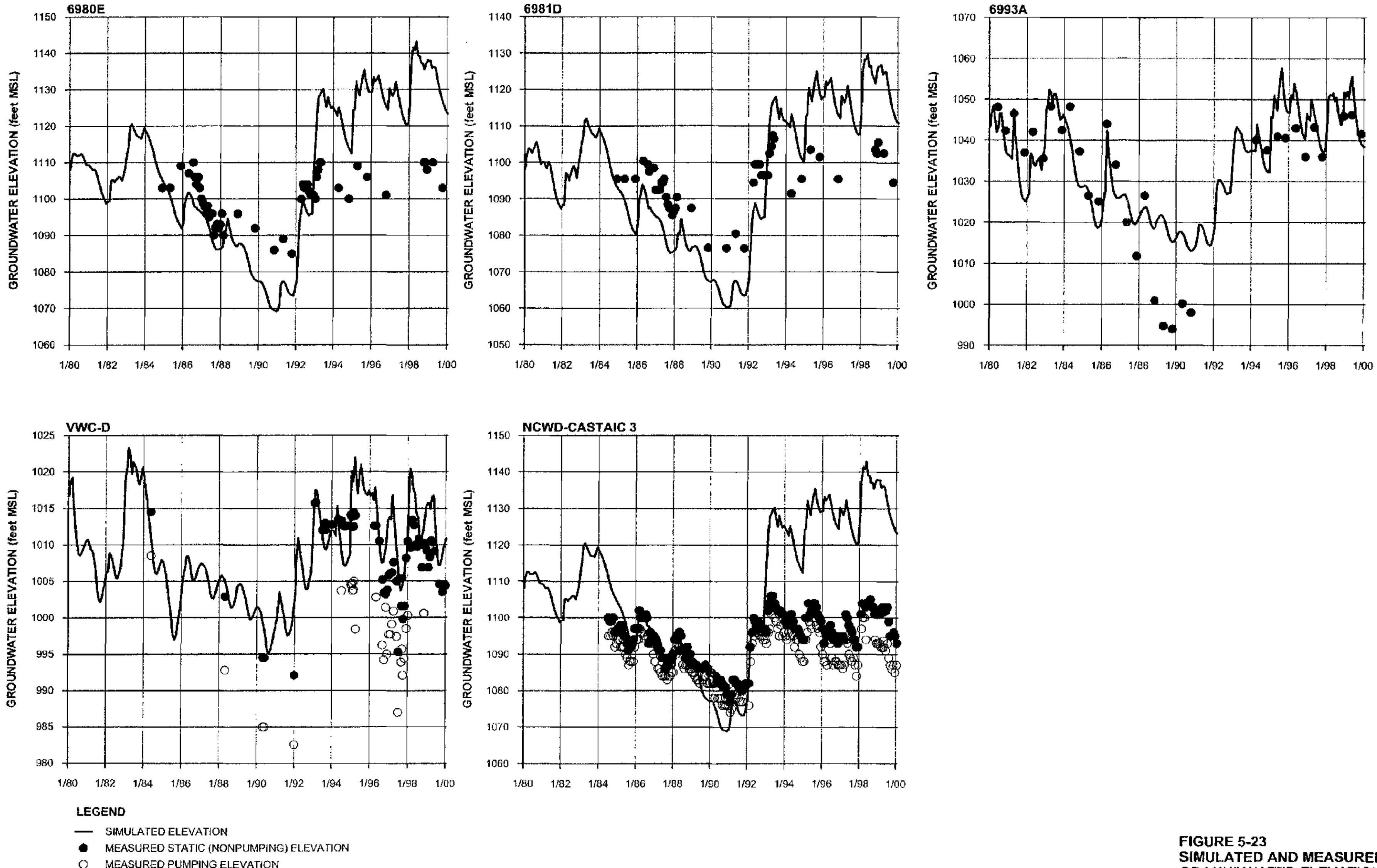
NOTE: SEE FIGURE 2-3 FOR LOCATION OF WELLS.

178973-314.GRF

FIGURE 5-22
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN ALLUVIAL AQUIFER WELLS IN SOLEDAD CANYON (PAGE 2 OF 2)

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

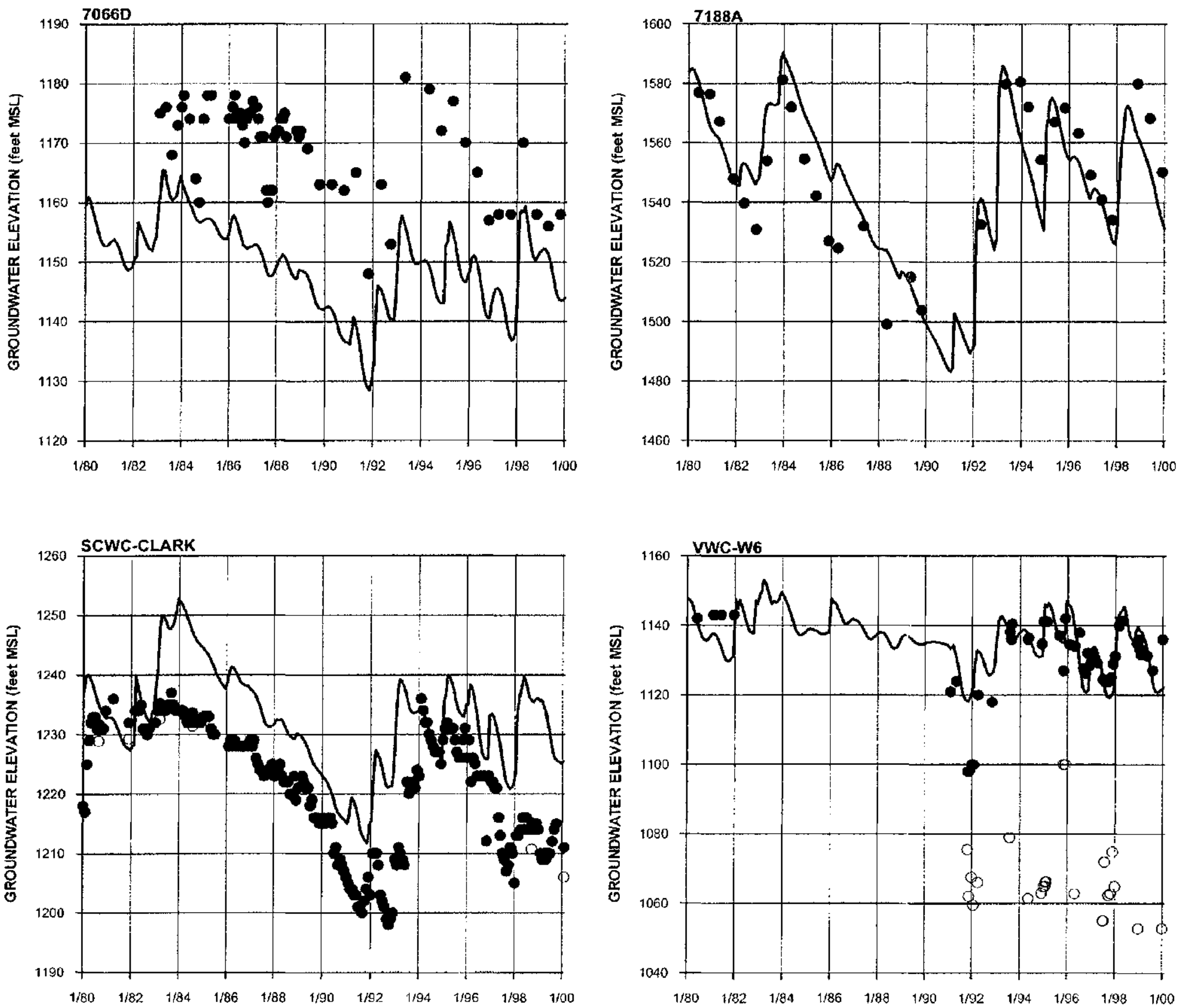


NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

175570-315.GRF

FIGURE 5-23
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN ALLUVIAL AQUIFER WELLS ALONG CASTAIC CREEK
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



LEGEND

— SIMULATED ELEVATION

● MEASURED STATIC (NONPUMPING) ELEVATION

○ MEASURED PUMPING ELEVATION

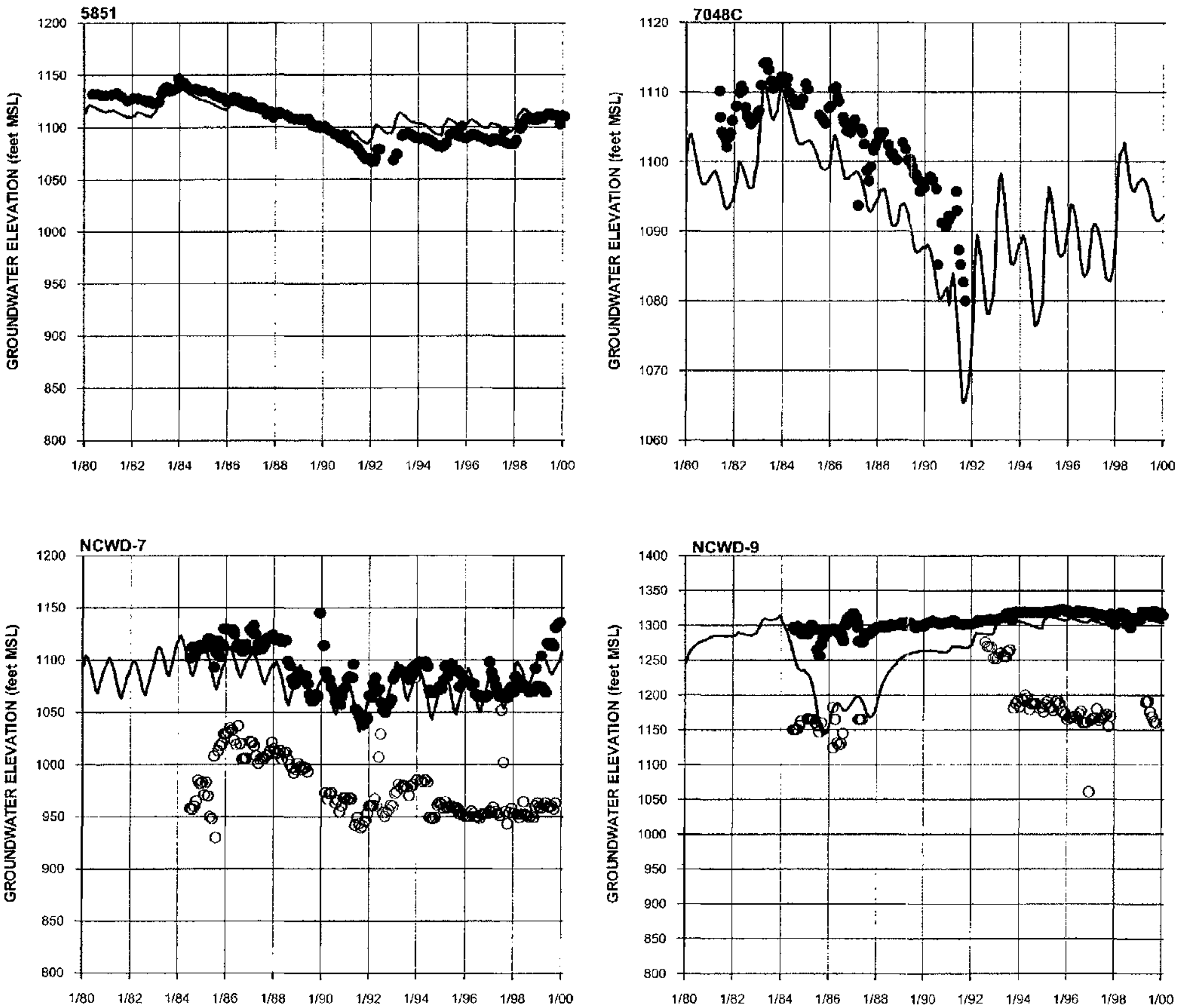
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

175570-316.GRF

FIGURE 5-24
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN ALLUVIAL AQUIFER WELLS IN OTHER TRIBUTARY CANYONS TO THE SANTA CLARA RIVER

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



LEGEND

— SIMULATED ELEVATION

● MEASURED STATIC (NONPUMPING) ELEVATION

○ MEASURED PUMPING ELEVATION

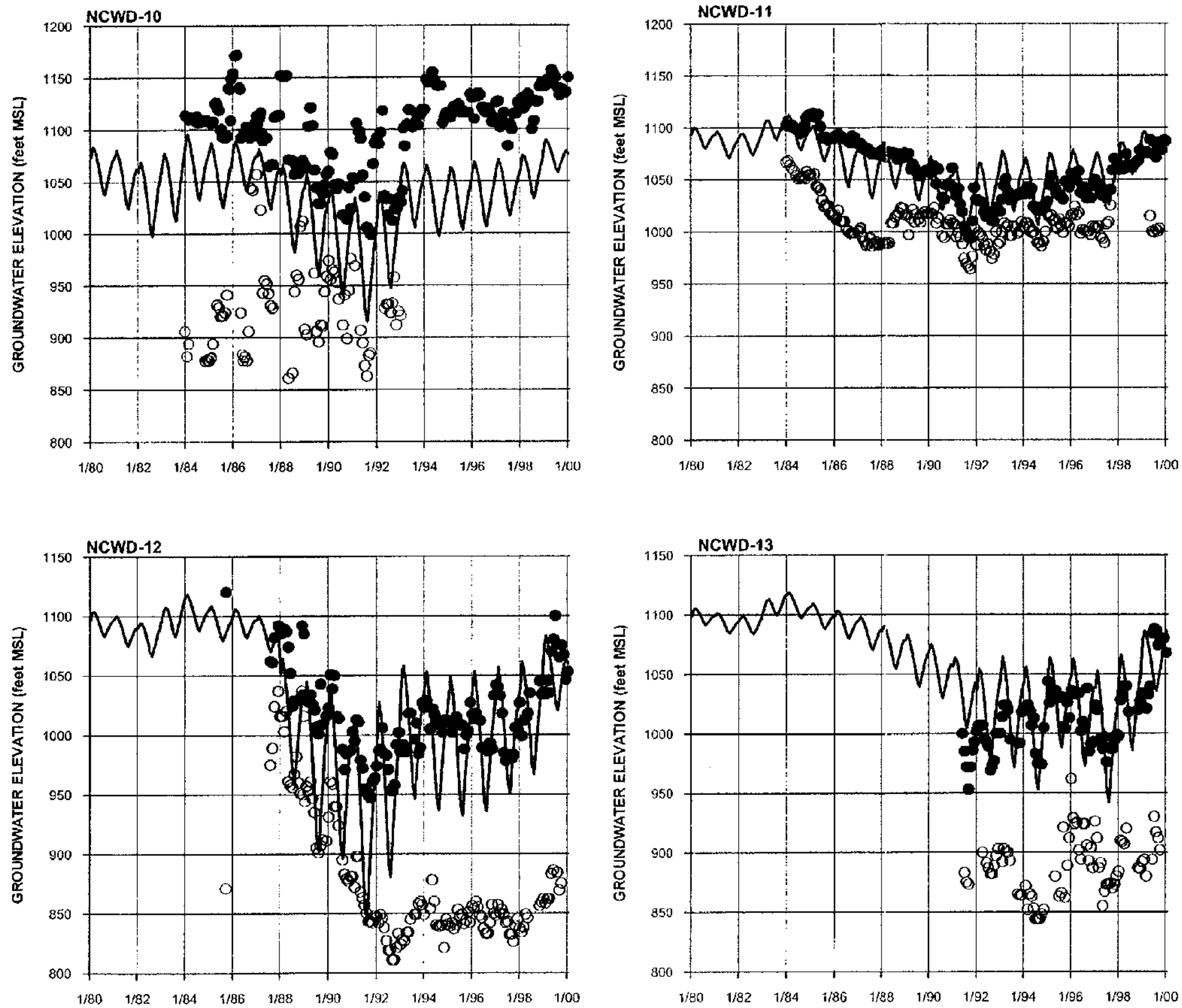
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

175570-319.GRF

FIGURE 5-25
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN SAUGUS FORMATION WELLS
(PAGE 1 OF 3)

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



LEGEND

— SIMULATED ELEVATION

● MEASURED STATIC (NONPUMPING) ELEVATION

○ MEASURED PUMPING ELEVATION

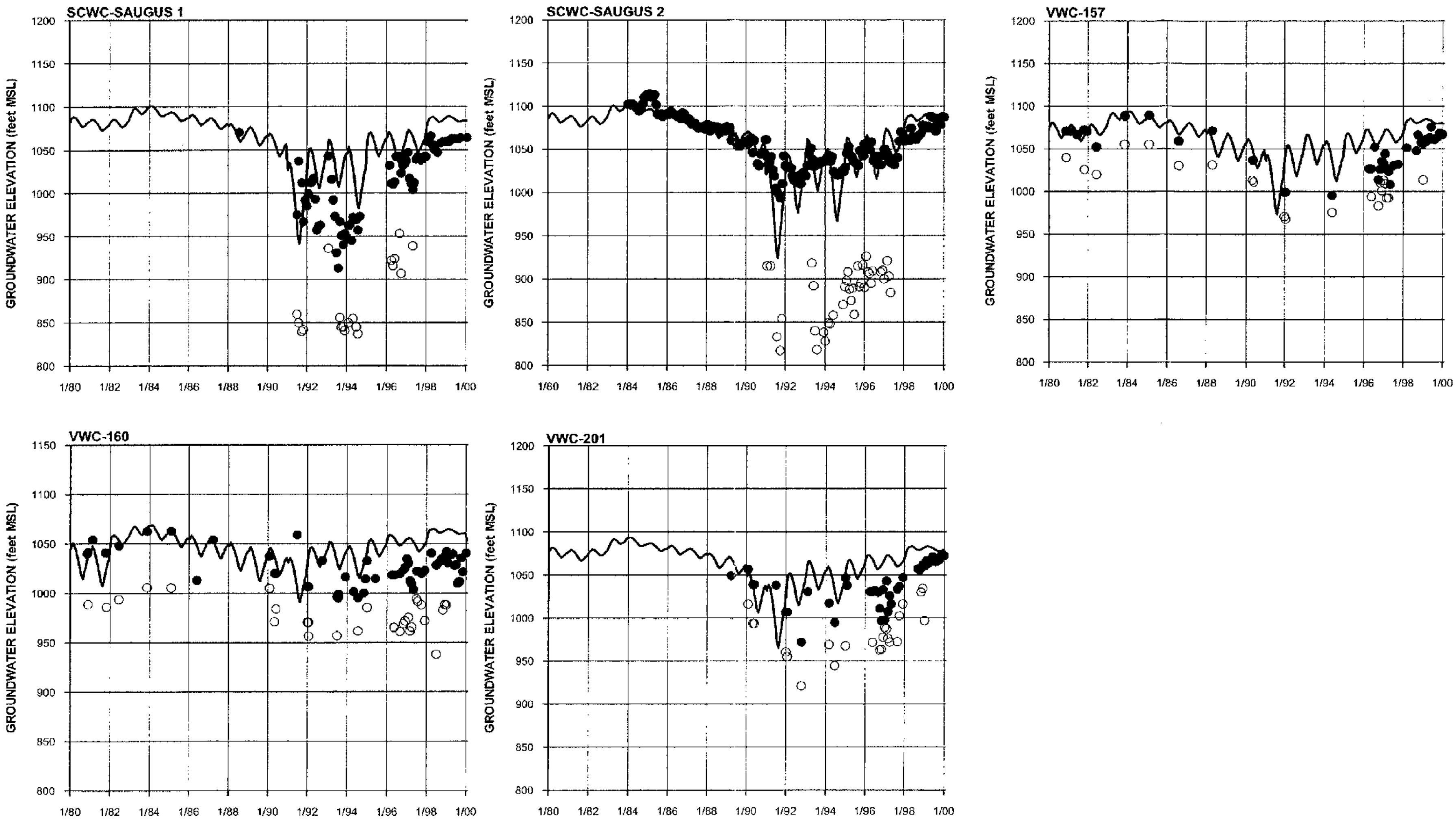
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

175570-317.GRF

FIGURE 5-25
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN SAUGUS FORMATION WELLS (PAGE 2 0F 3)

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



LEGEND

- SIMULATED ELEVATION
- ● MEASURED STATIC (NONPUMPING) ELEVATION
- ○ MEASURED PUMPING ELEVATION

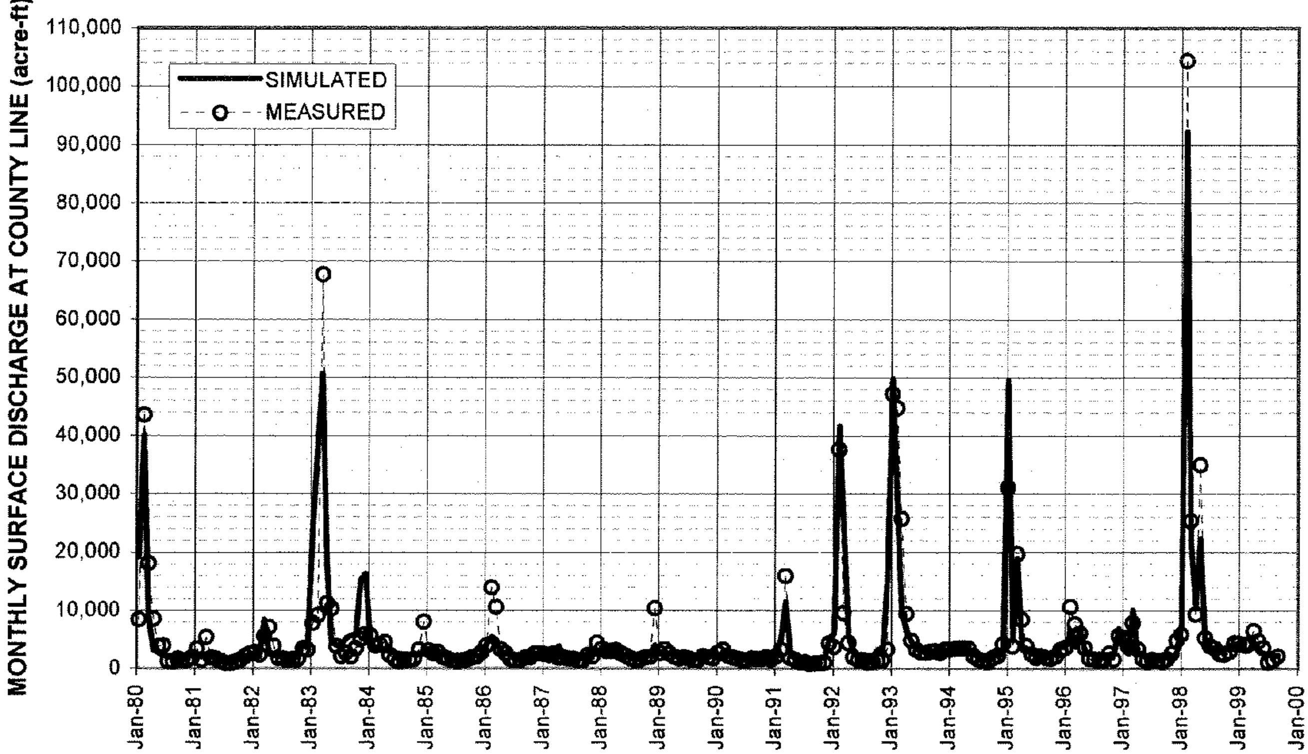
NOTE: SEE FIGURE 2-3 FOR LOCATIONS OF WELLS.

175570-318.GRF

FIGURE 5-25
SIMULATED AND MEASURED GROUNDWATER ELEVATIONS IN SAUGUS FORMATION WELLS (PAGE 3 OF 3)

REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



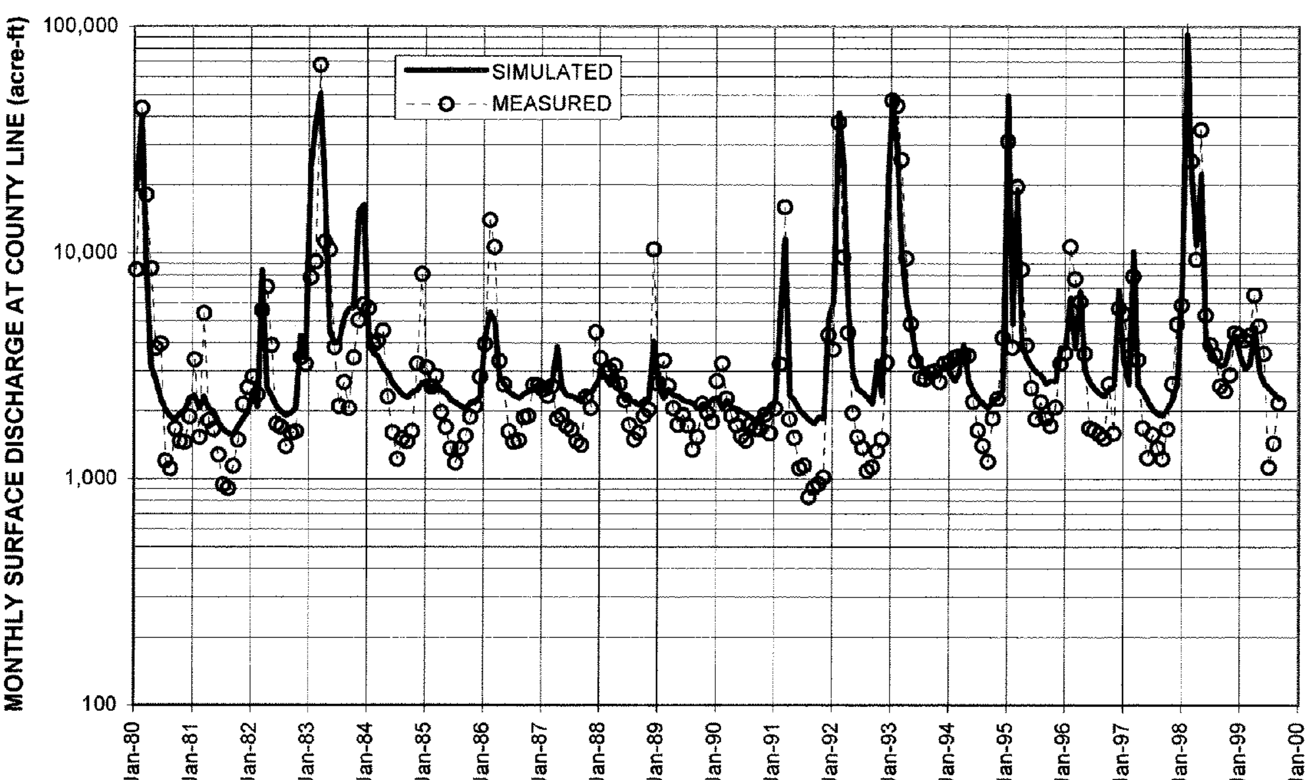


FIGURE 5-26
SIMULATED VERSUS MEASURED HYDROGRAPHS OF SANTA CLARA RIVER FLOW AT COUNTY LINE
REGIONAL GROUNDWATER FLOW MODEL FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-404.xls\FIG5-26

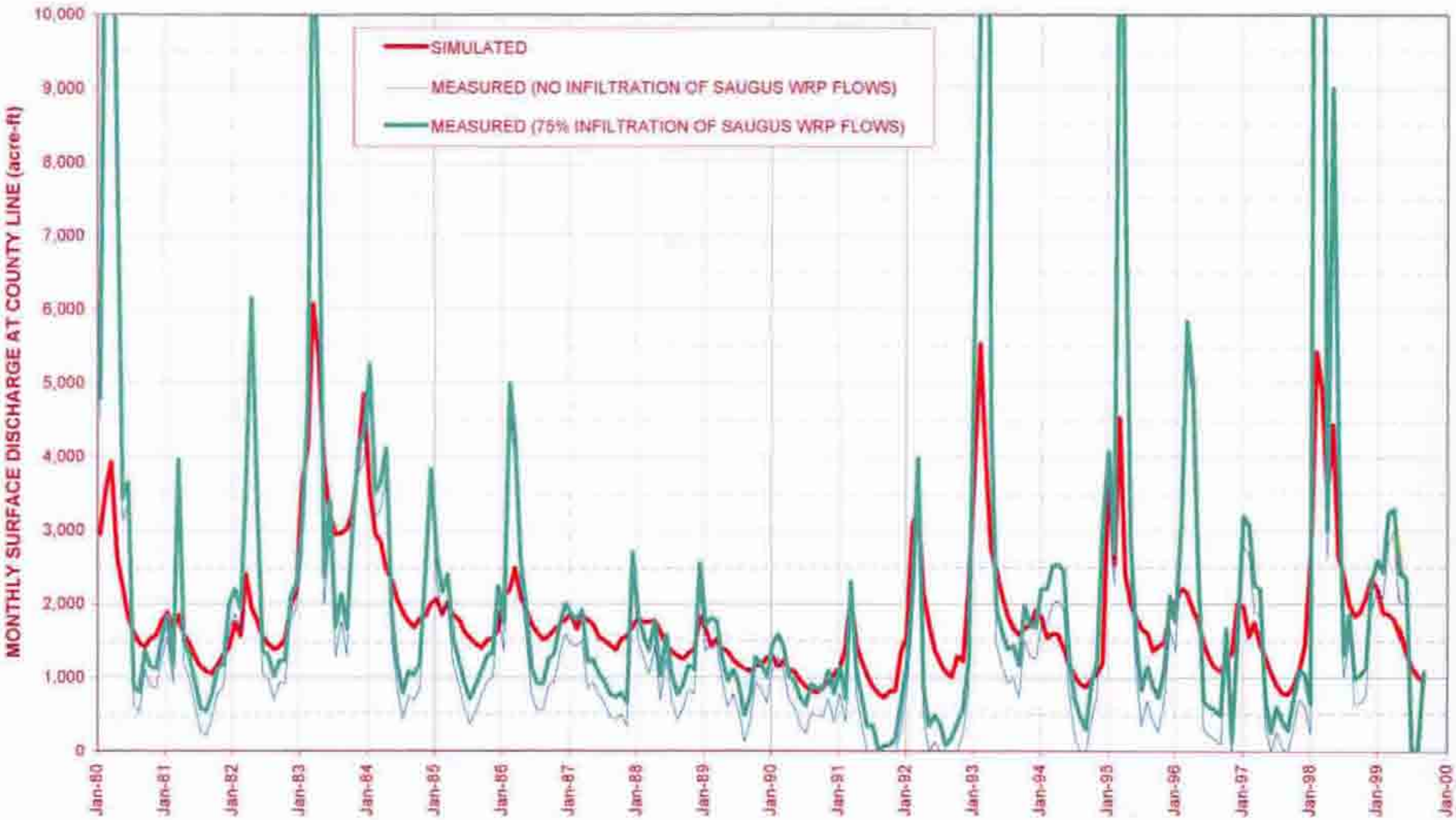


FIGURE 5-27
SIMULATED VERSUS MEASURED HYDROGRAPH OF GROUNDWATER DISCHARGE TO SANTA CLARA RIVER
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

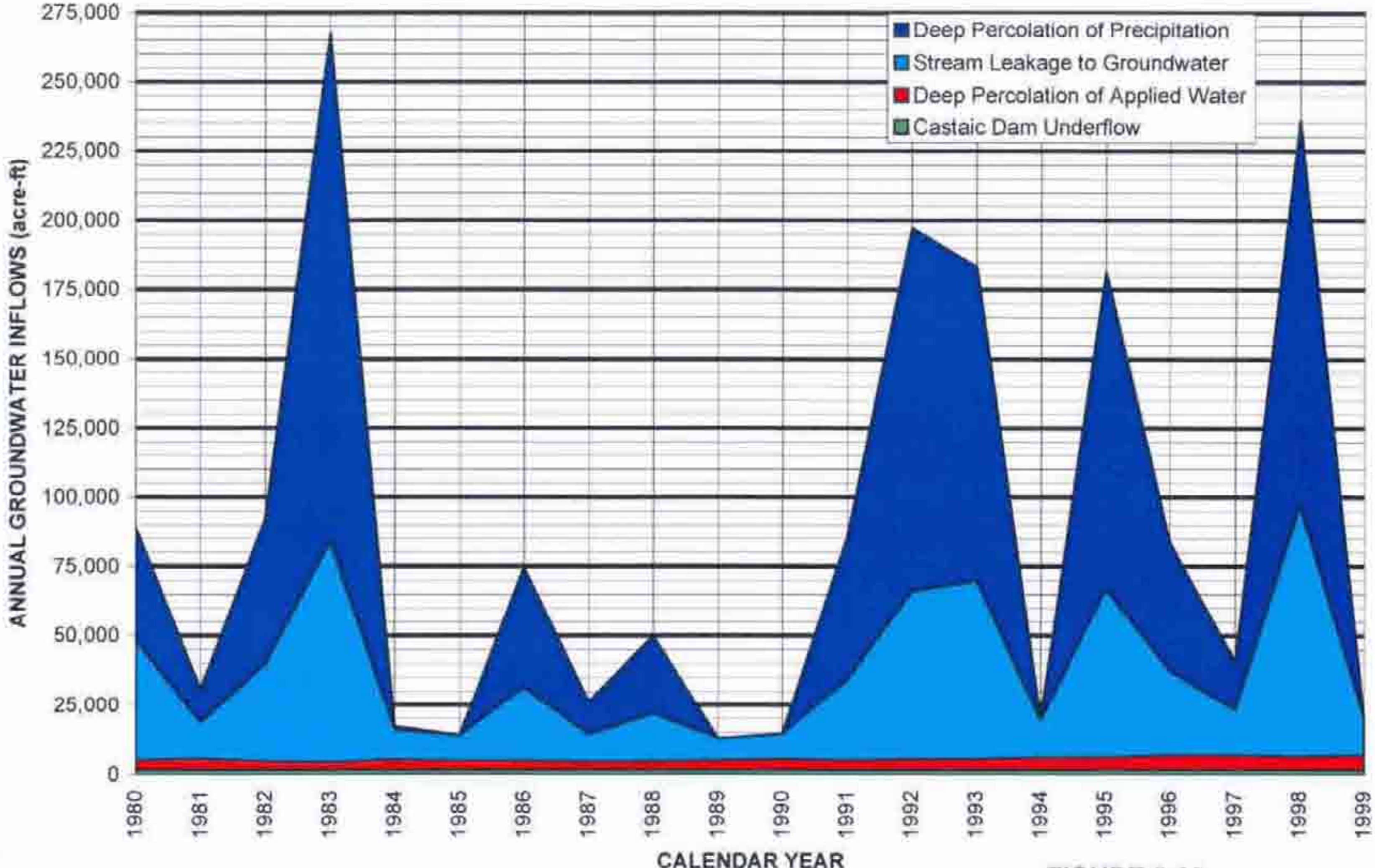


FIGURE 5-28
ANNUAL GROUNDWATER INFLOWS
REGIONAL GROUNDWATER FLOW MODEL REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

04/04/2004
178973-410.xls/Fig 5-28

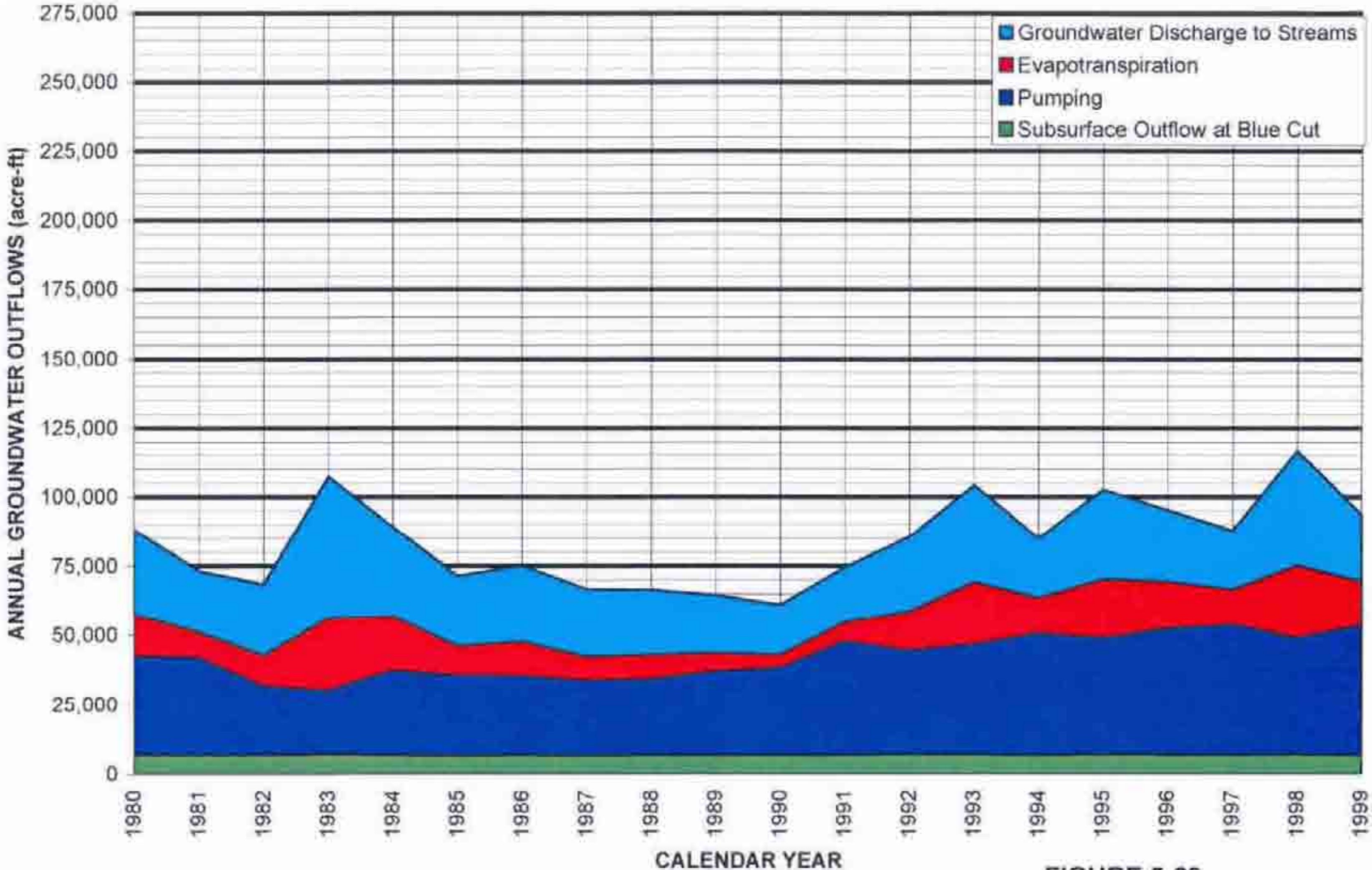


FIGURE 5-29
ANNUAL GROUNDWATER OUTFLOWS
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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178973-410.xls/Fig 5-29

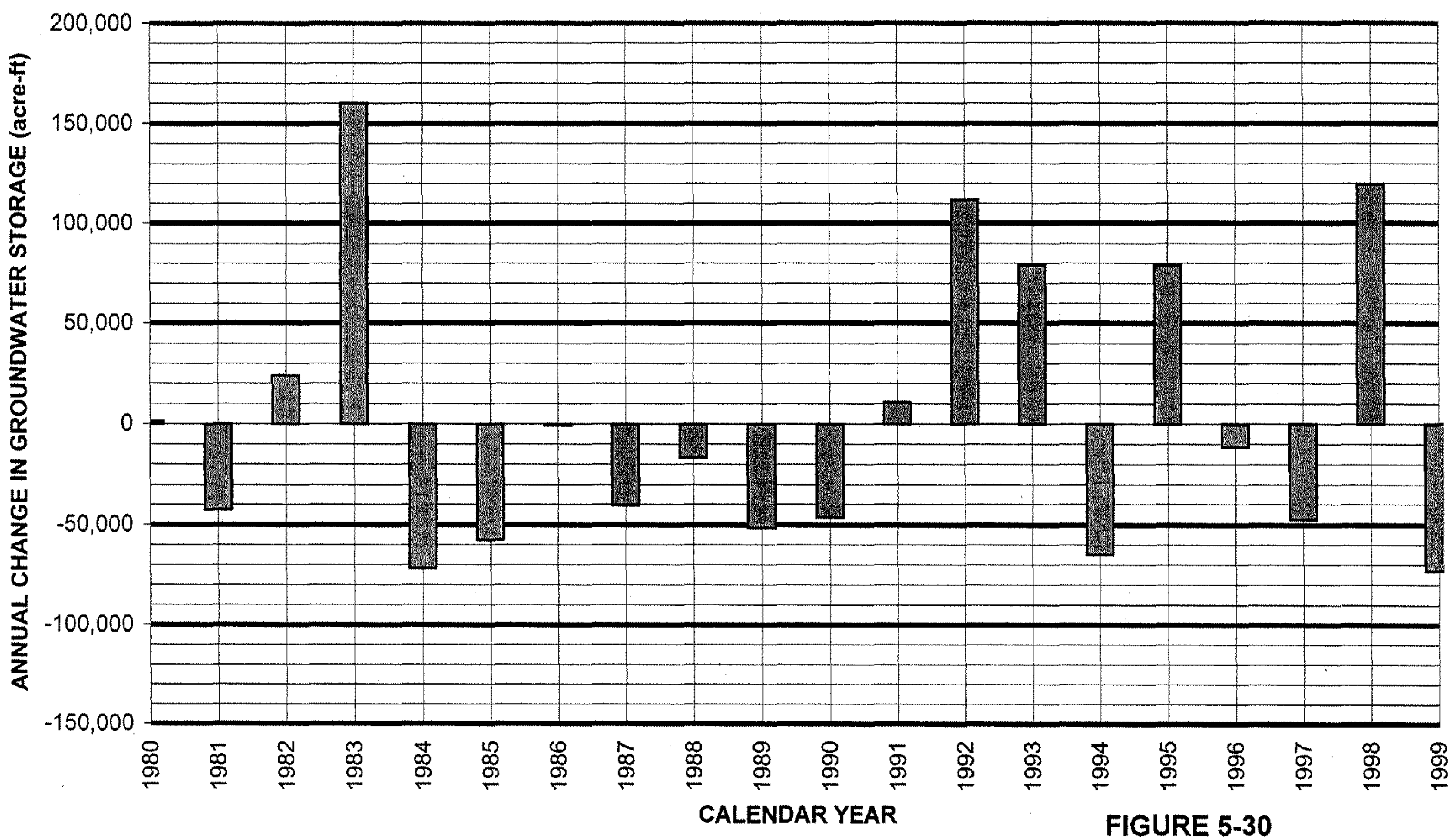


FIGURE 5-30
ANNUAL CHANGE IN GROUNDWATER STORAGE
REGIONAL GROUNDWATER FLOW MODEL REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

04/04/2004
178973-410.xls/Fig 5-30

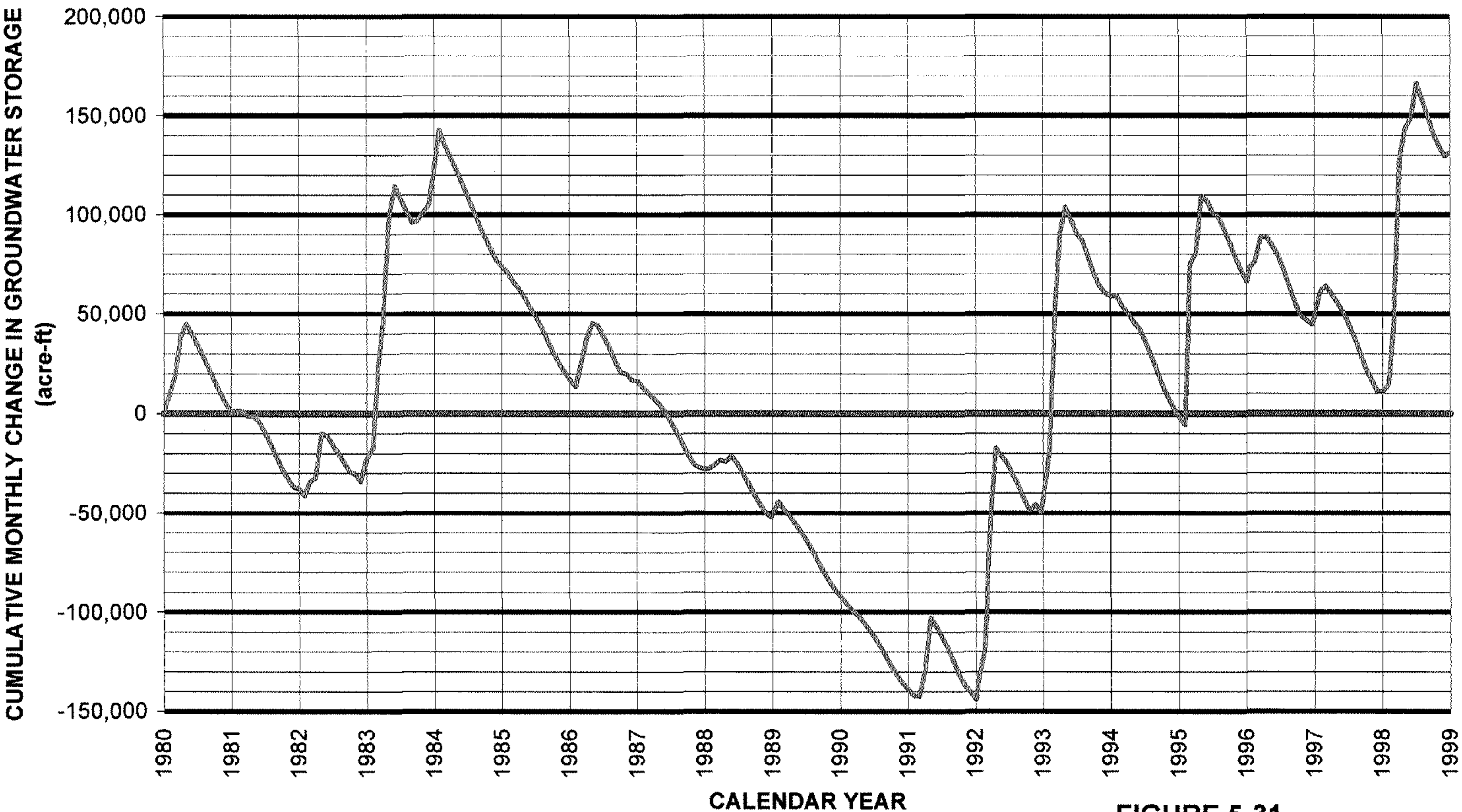
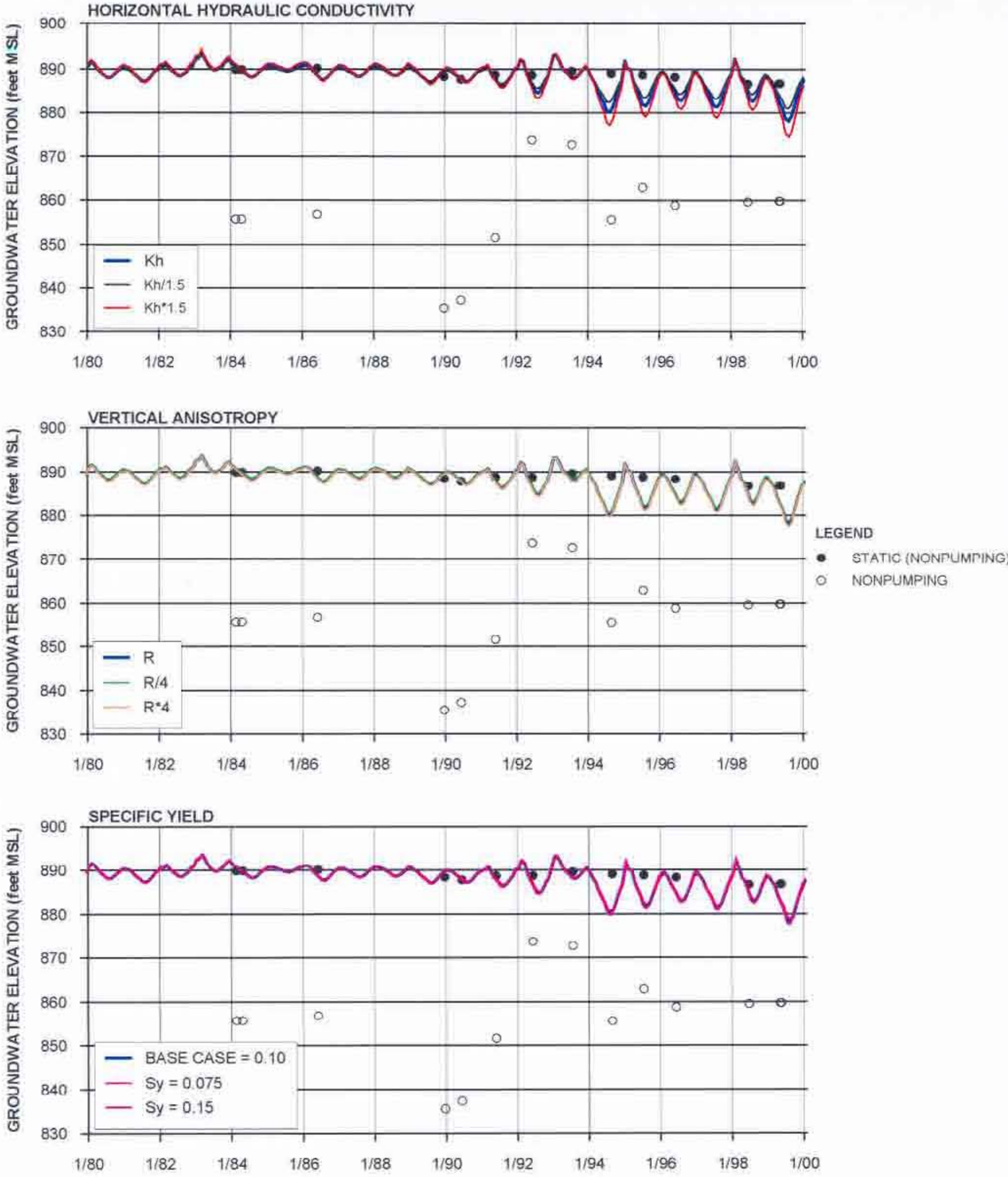


FIGURE 5-31
CUMULATIVE CHANGE IN GROUNDWATER STORAGE
REGIONAL GROUNDWATER FLOW MODEL REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



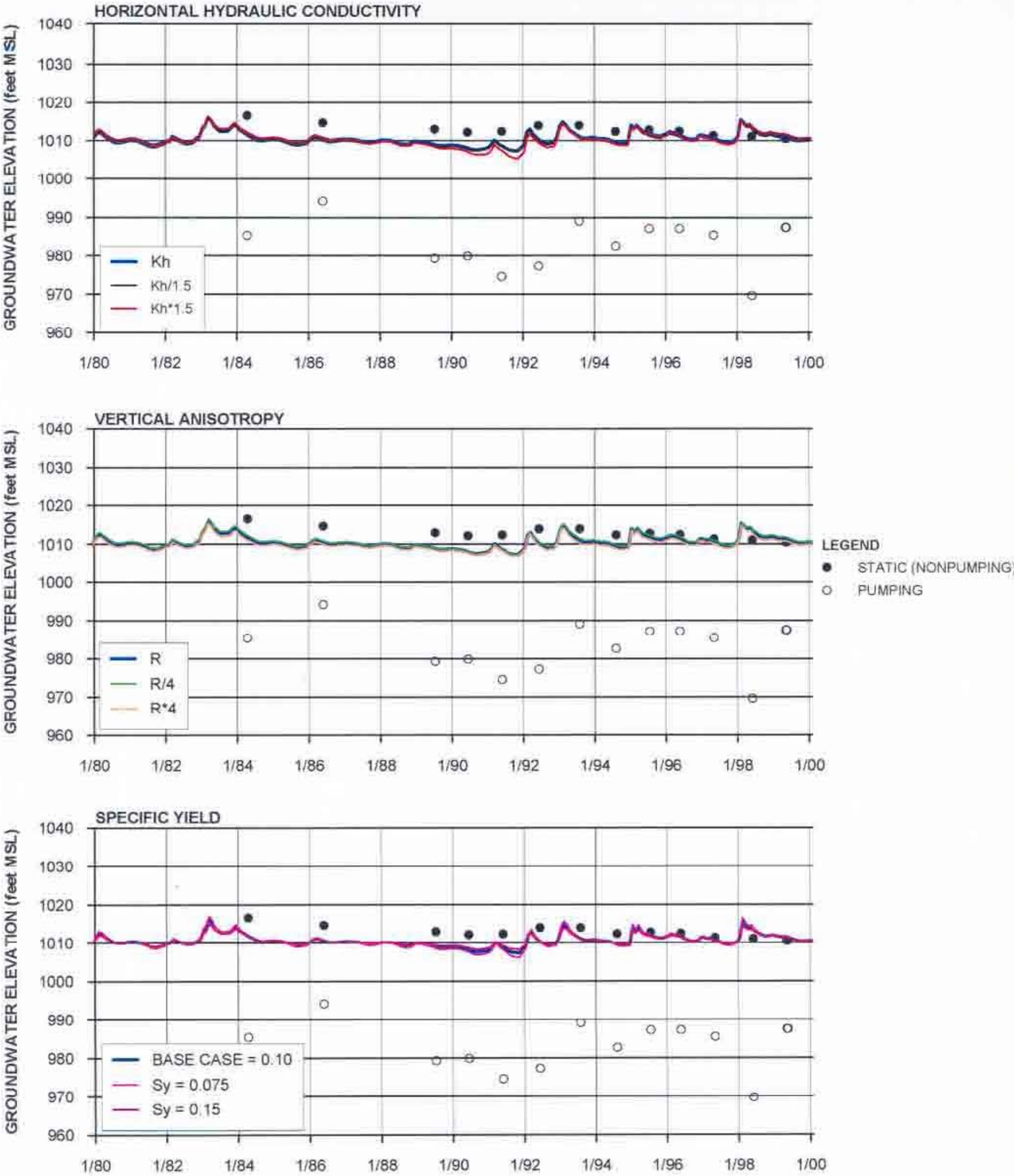
NOTES:

1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-32
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT NLF-B7 TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-311.GRF

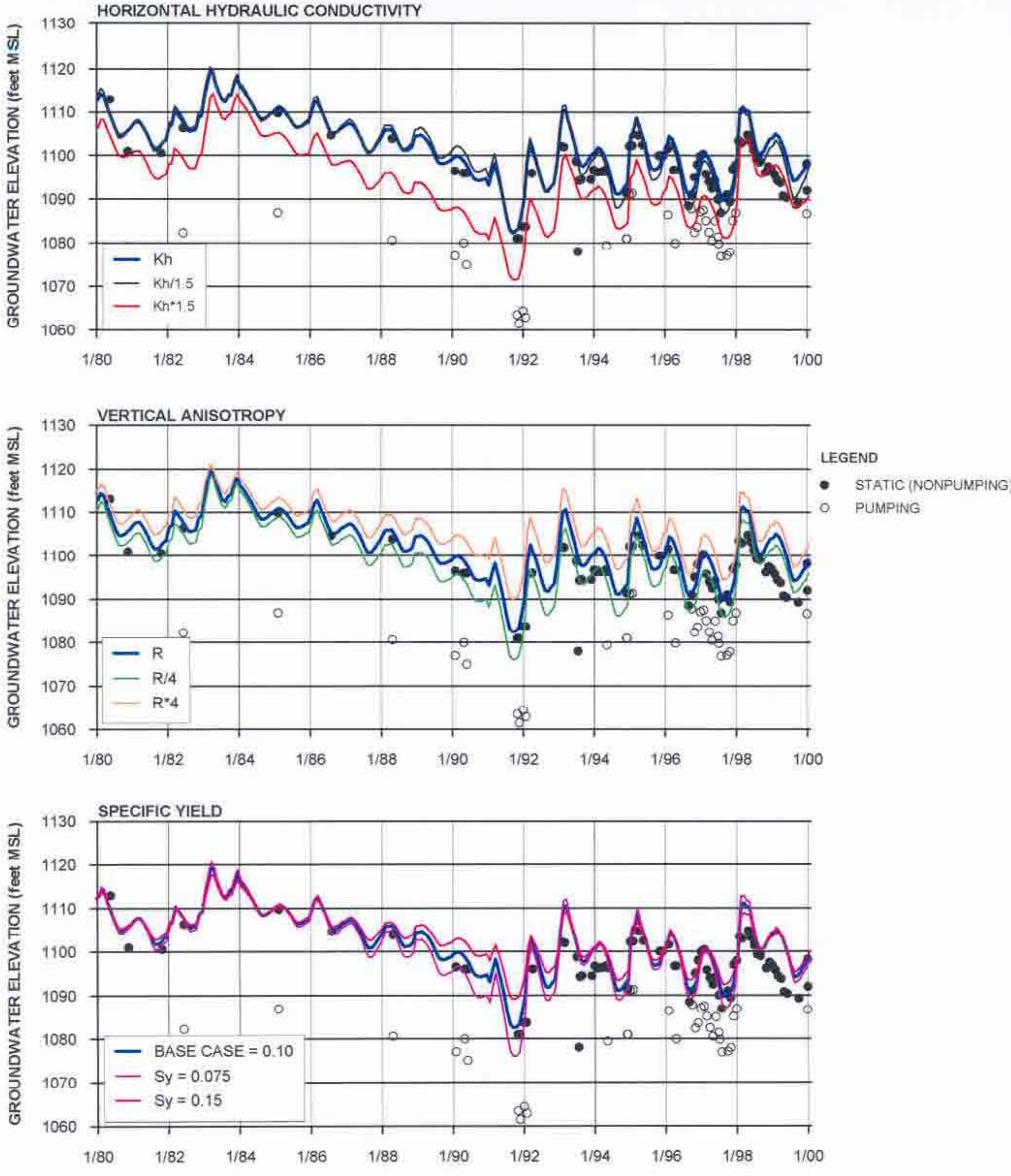


NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-33
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT NLF-G45 TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-320.GRF

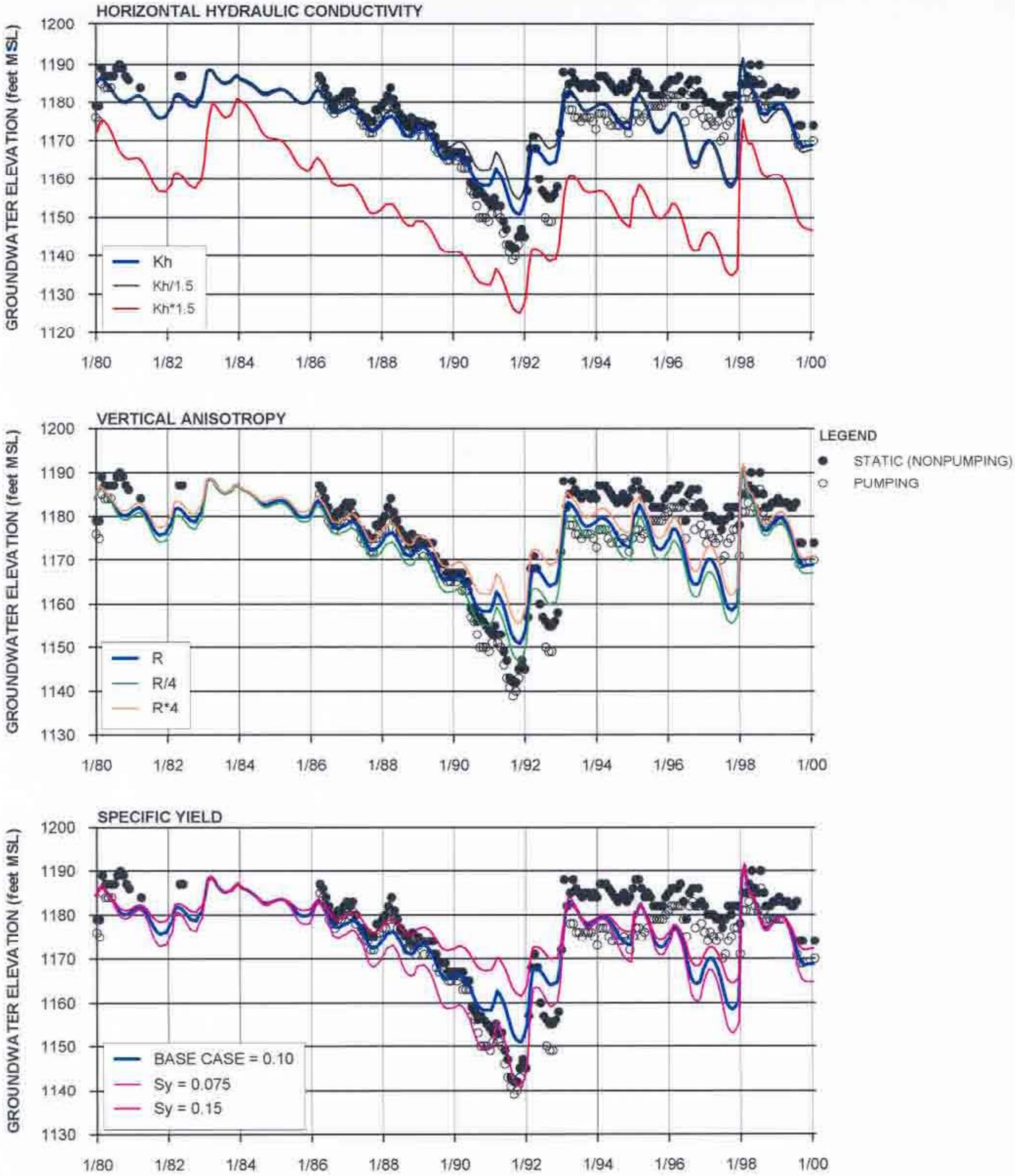


NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-34
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT VWC-N TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-321.GRF



NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-35
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT SCWC-STADIUM TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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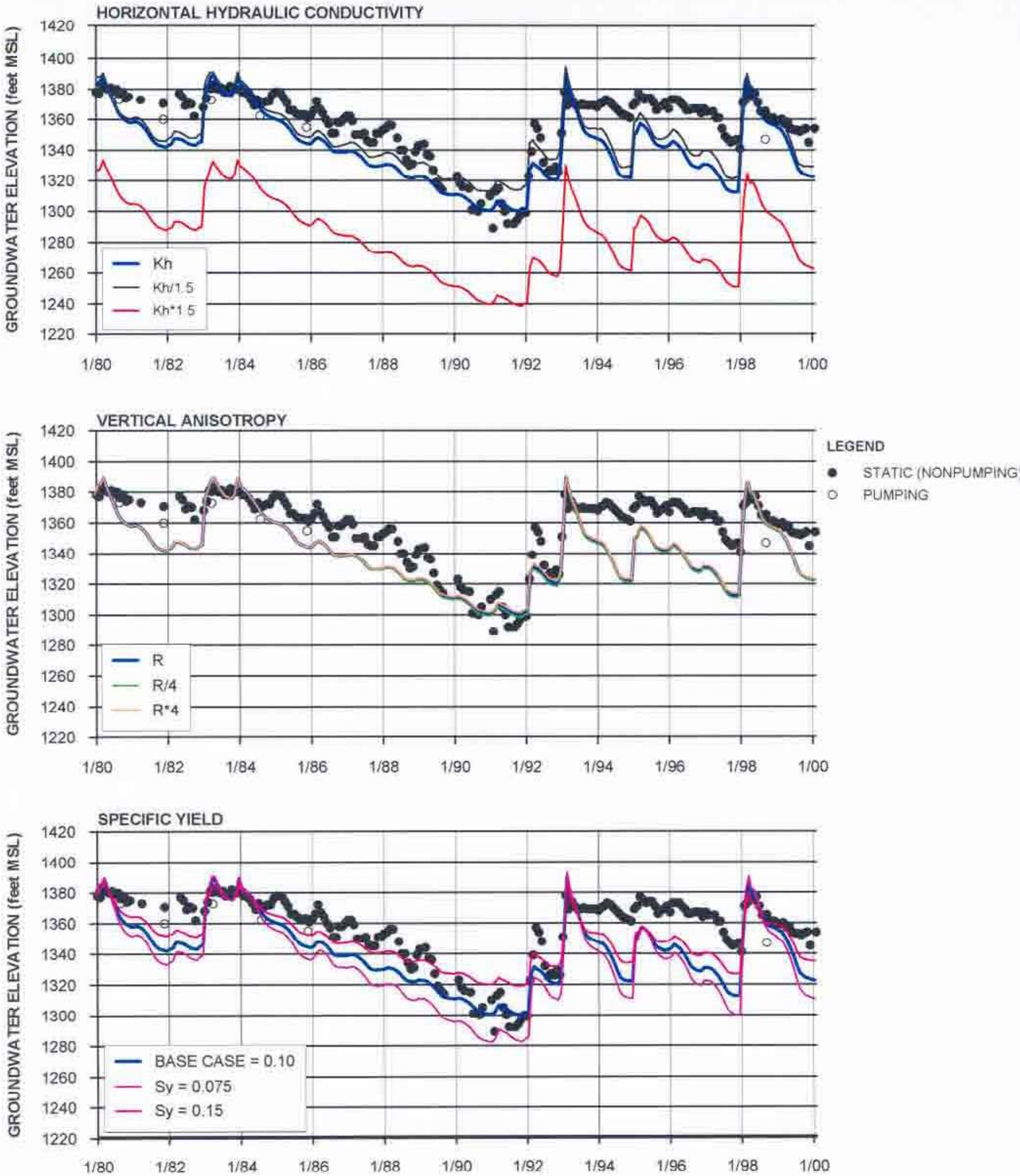

NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-36
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT SCWC-NORTH OAKS EAST TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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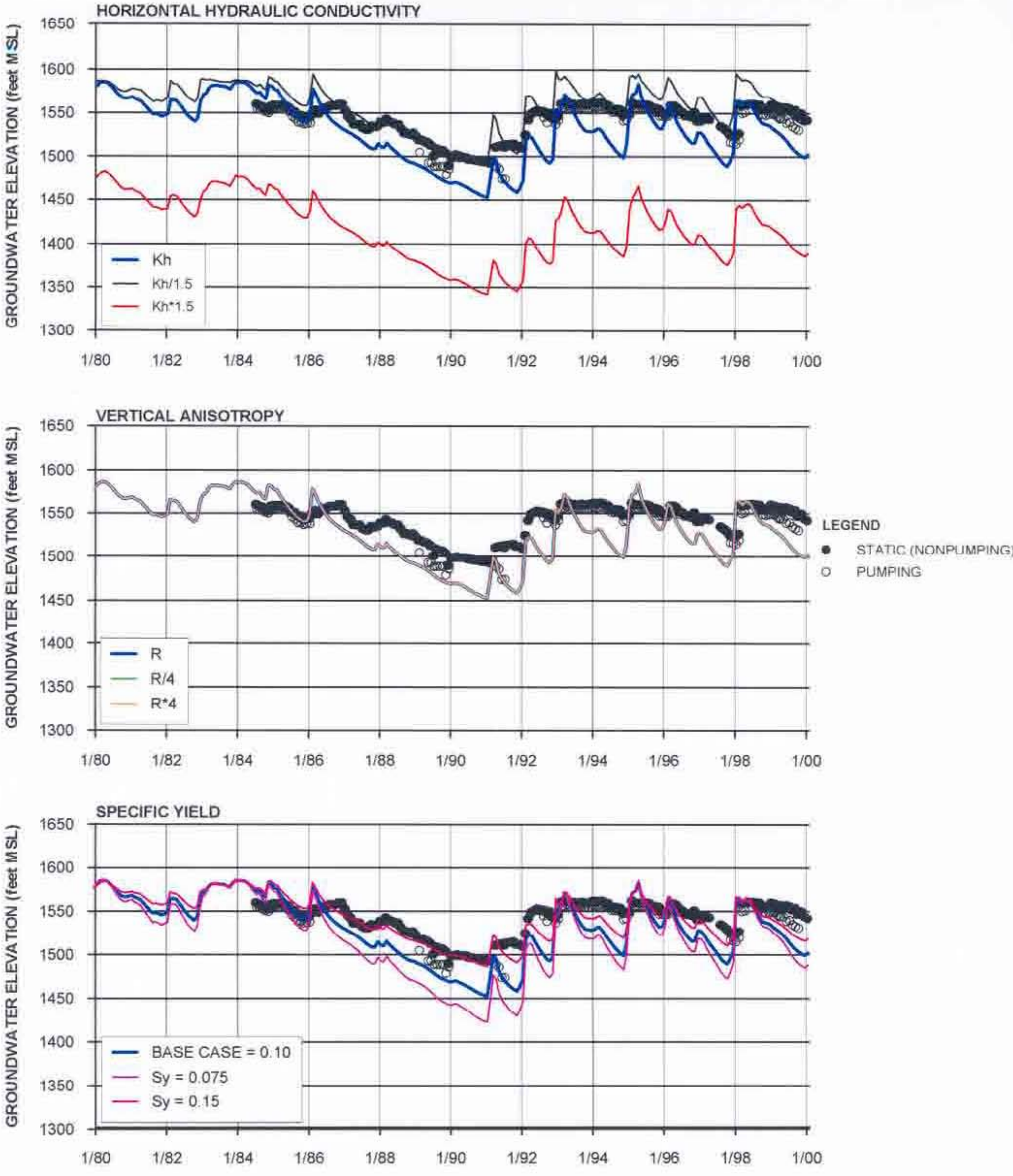
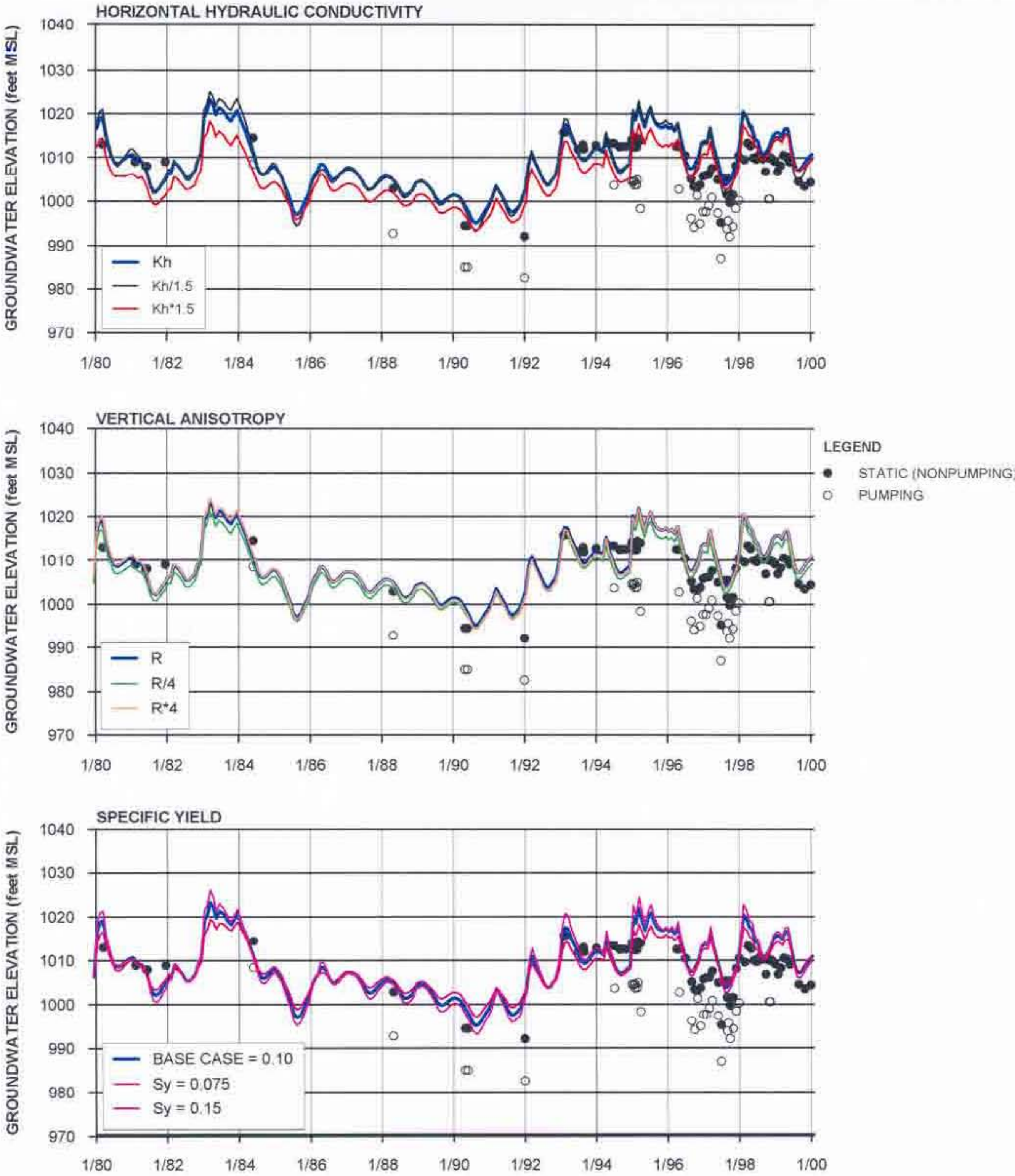


NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-37
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT NCWD-PINETREE1 TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-323.GRF



NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. Sy= SPECIFIC YIELD
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-38
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT VWC-D TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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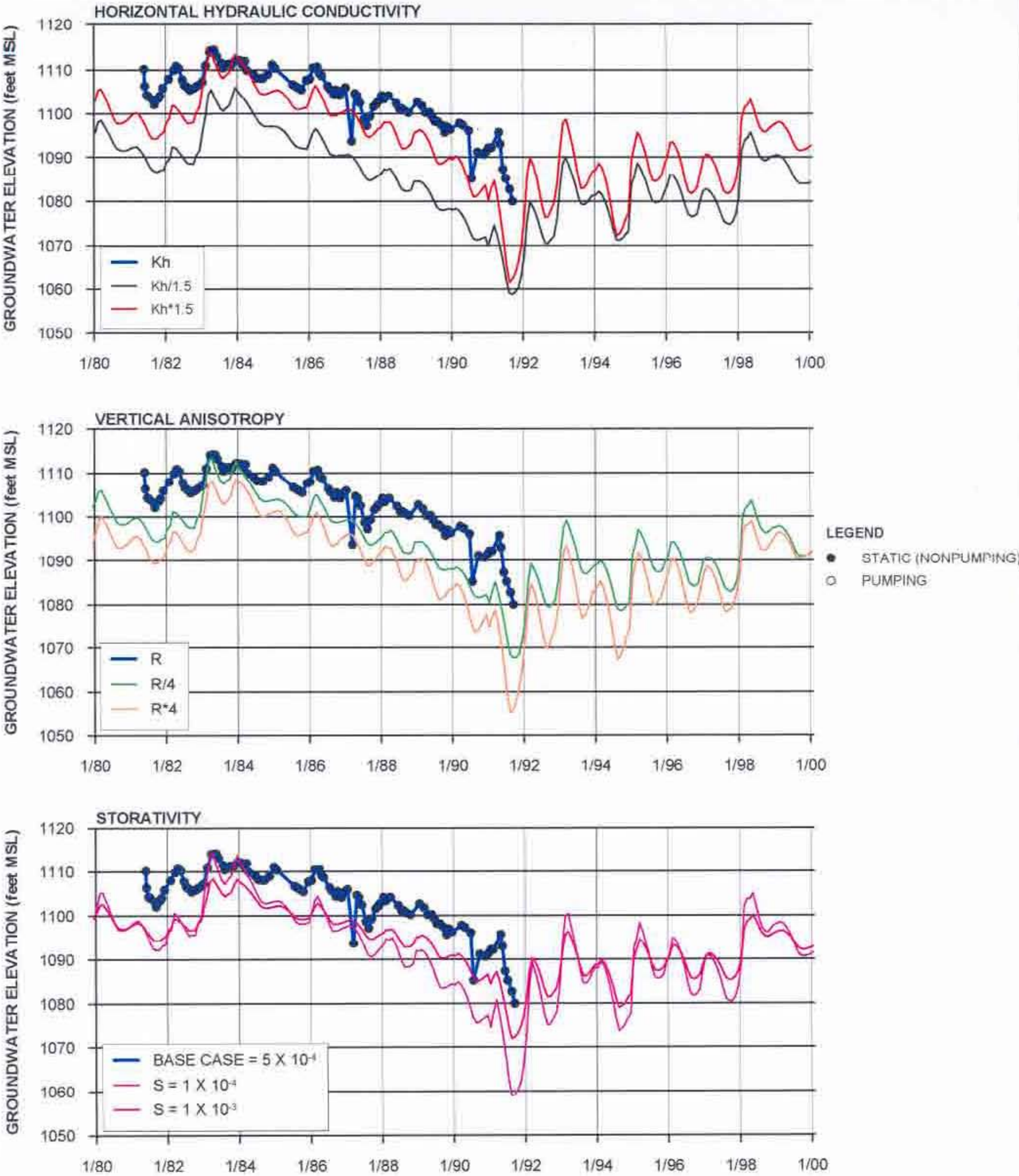
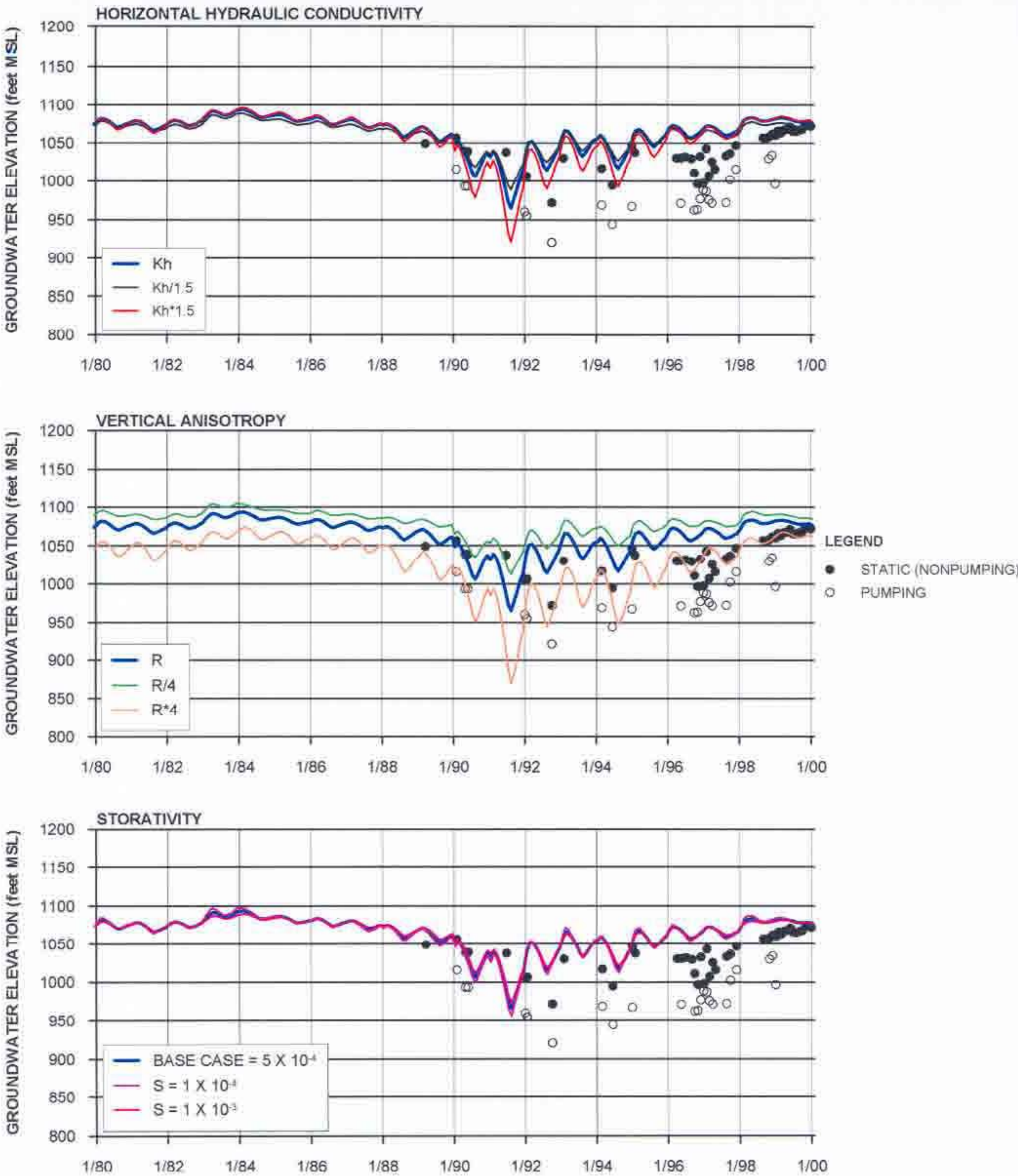


NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. S = STORATIVITY
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-39
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT 7048C TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-327.GRF



NOTES:

1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. S = STORATIVITY
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-40
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT VWC-201 TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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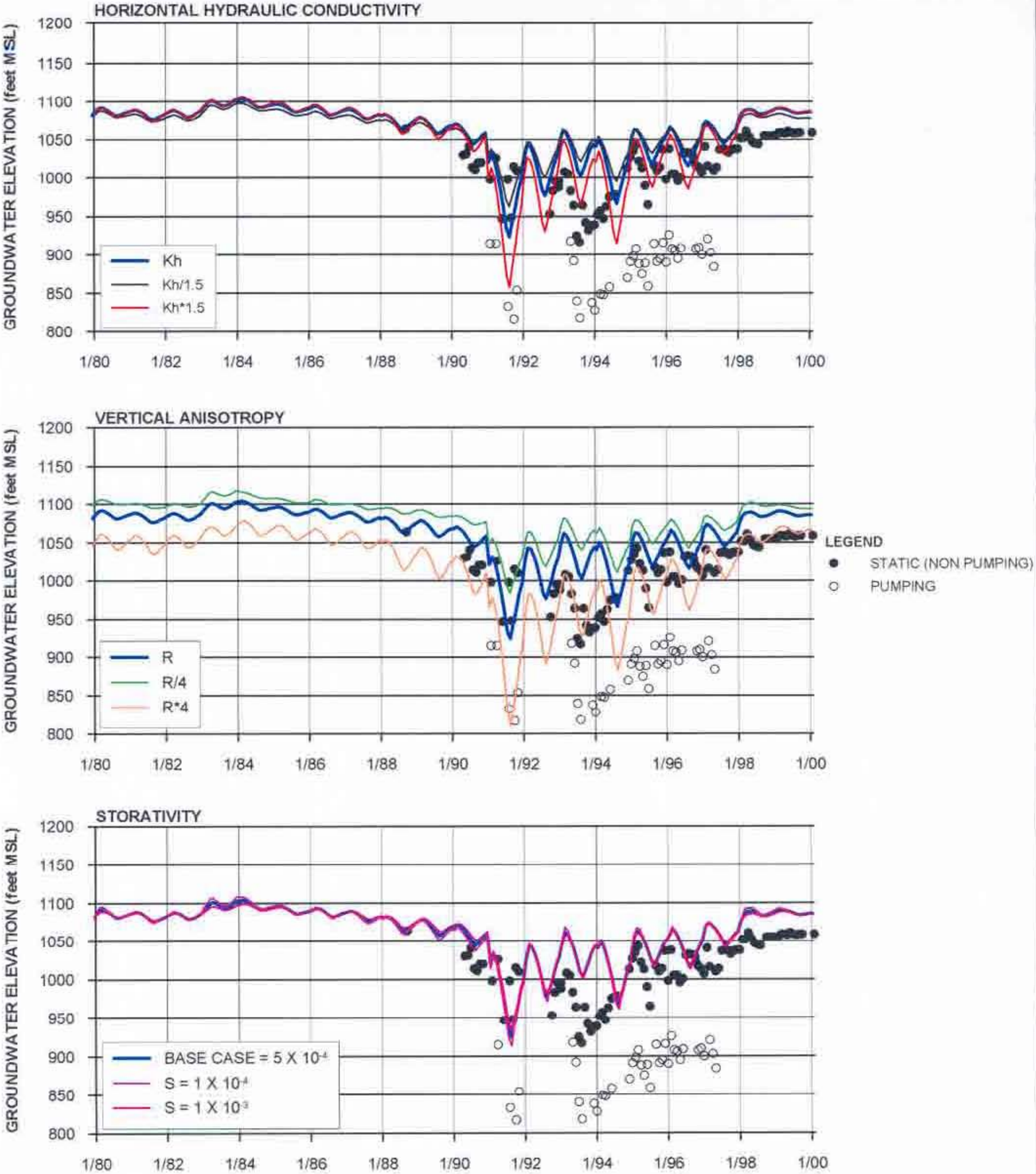

FIGURE 5-41
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT SCWC-SAUGUS 2 TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. S = STORATIVITY
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

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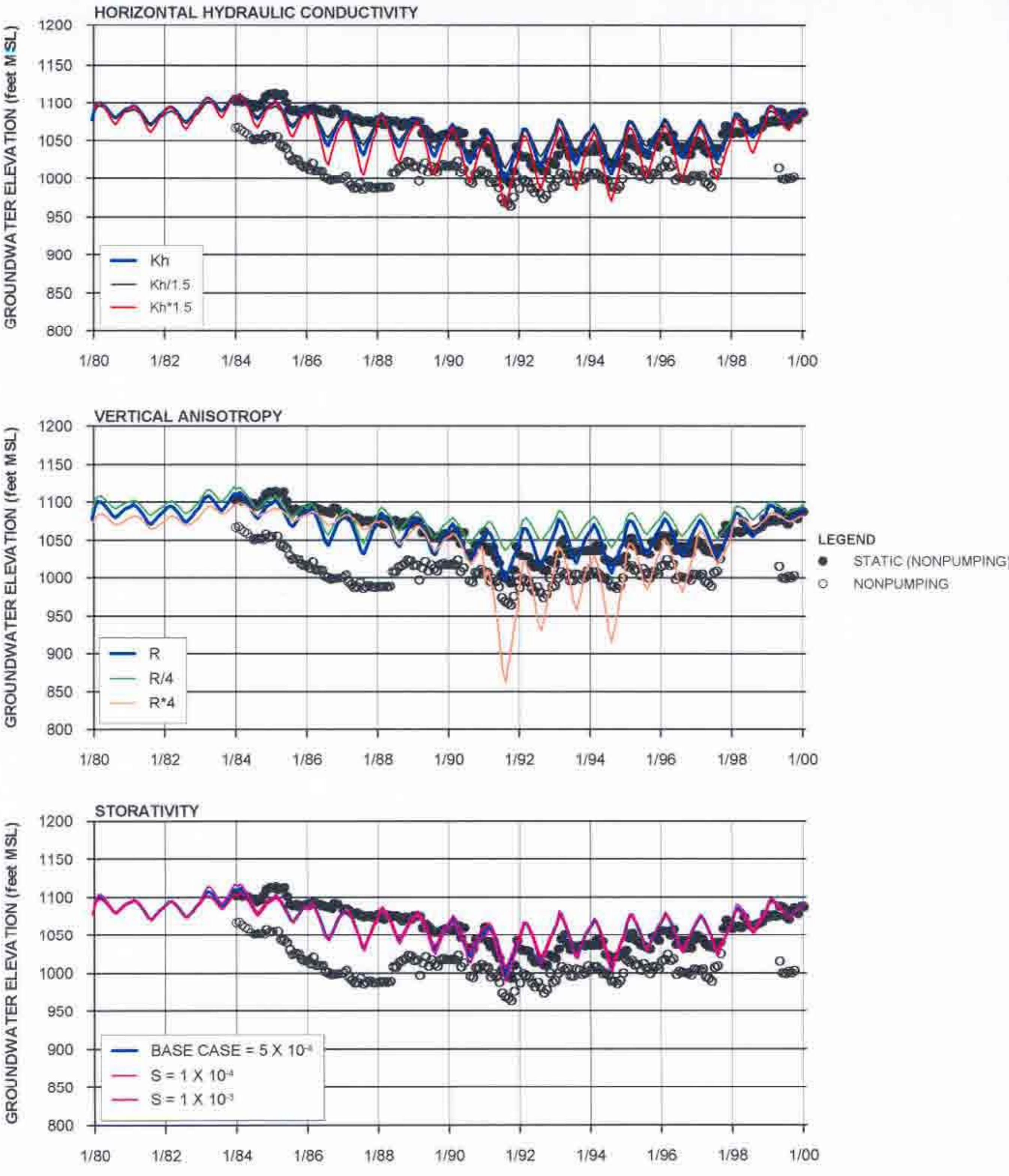
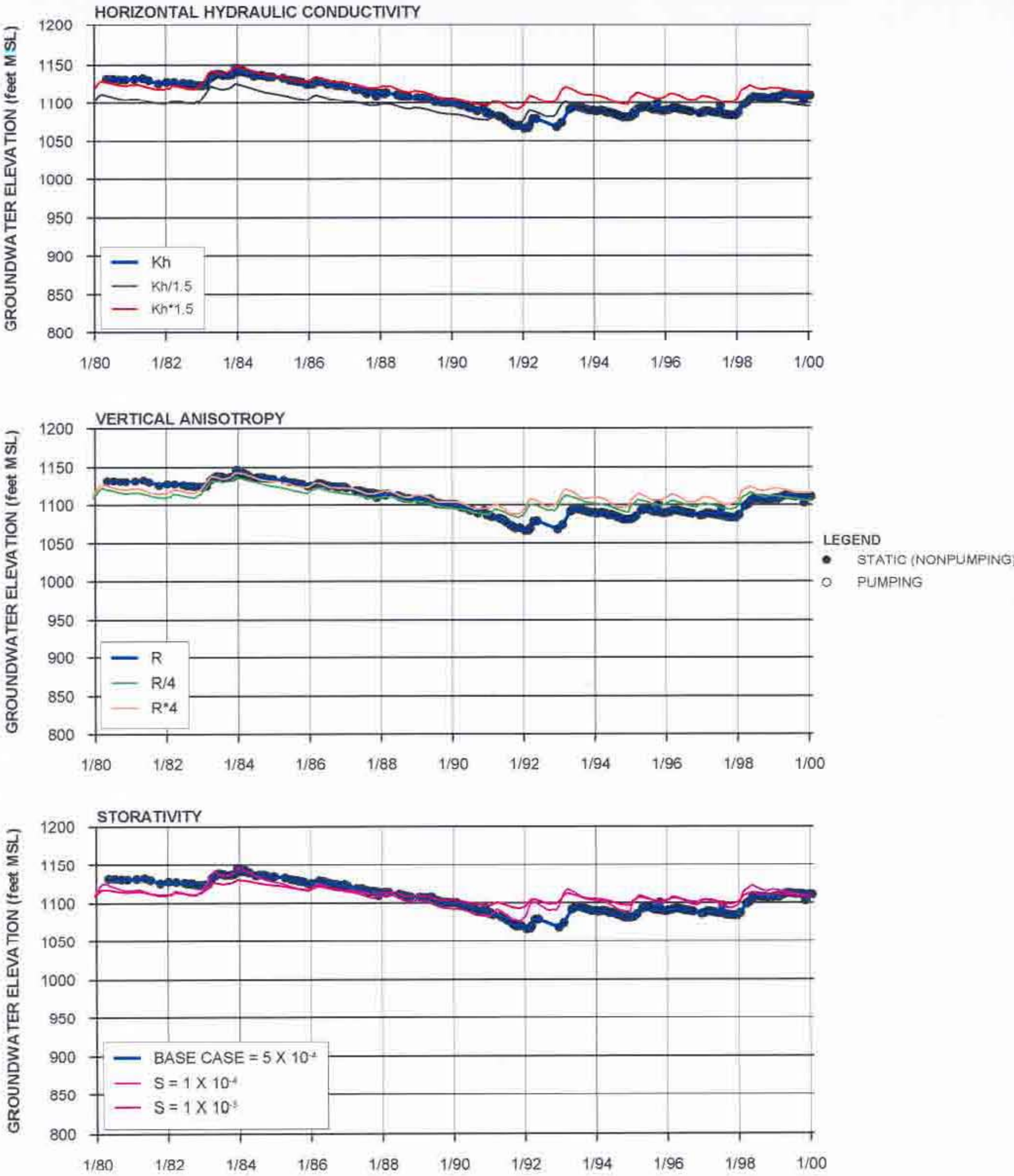


NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. S = STORATIVITY
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-42
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT NCWD-11 TO AQUIFER PARAMETER
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-330.GRF



NOTES:
1. Kh = HORIZONTAL HYDRAULIC CONDUCTIVITY
2. R = VERTICAL ANISOTROPY RATIO (RATIO OF HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY)
3. S = STORATIVITY
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-43
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT 5851 TO AQUIFER PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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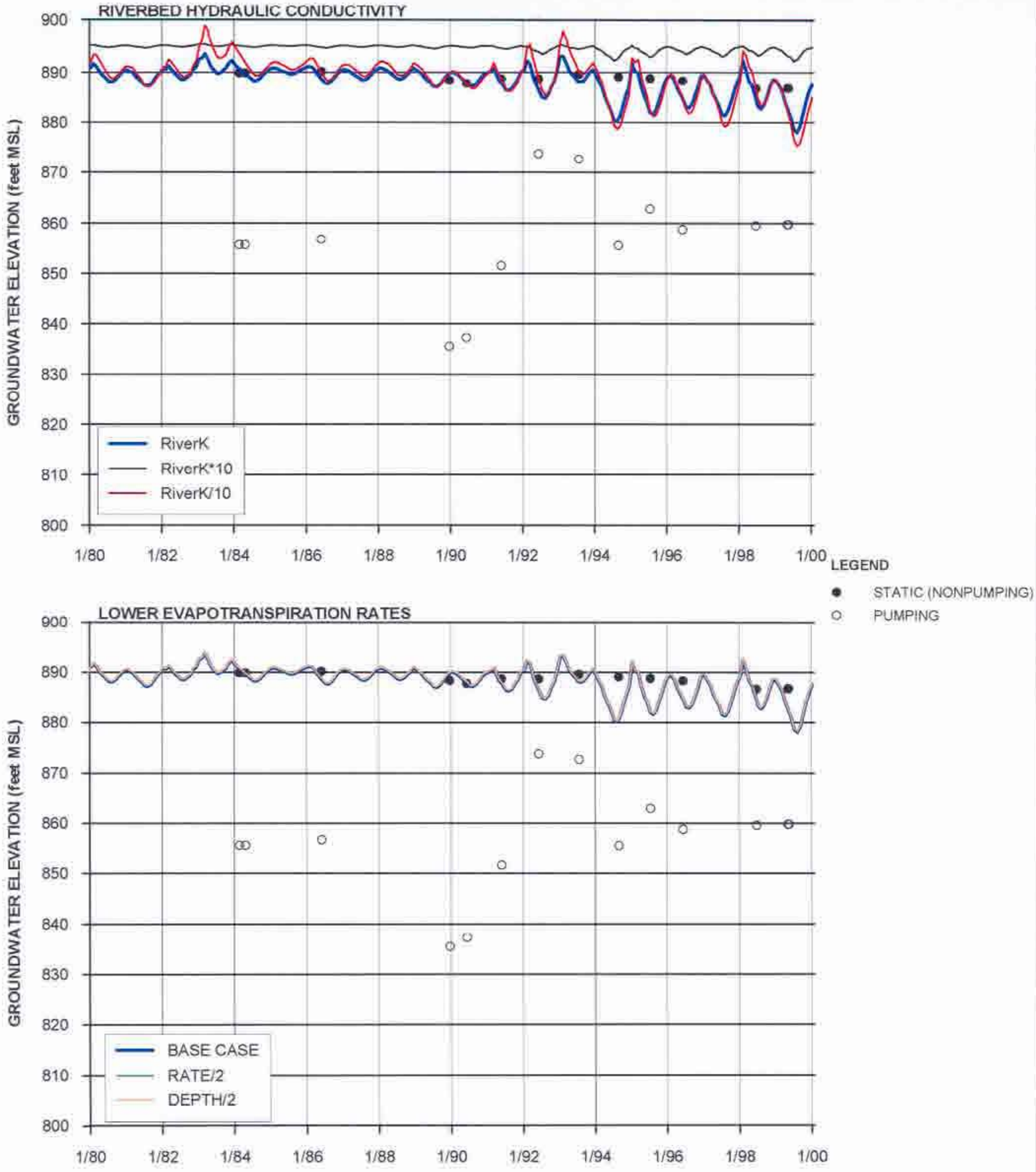
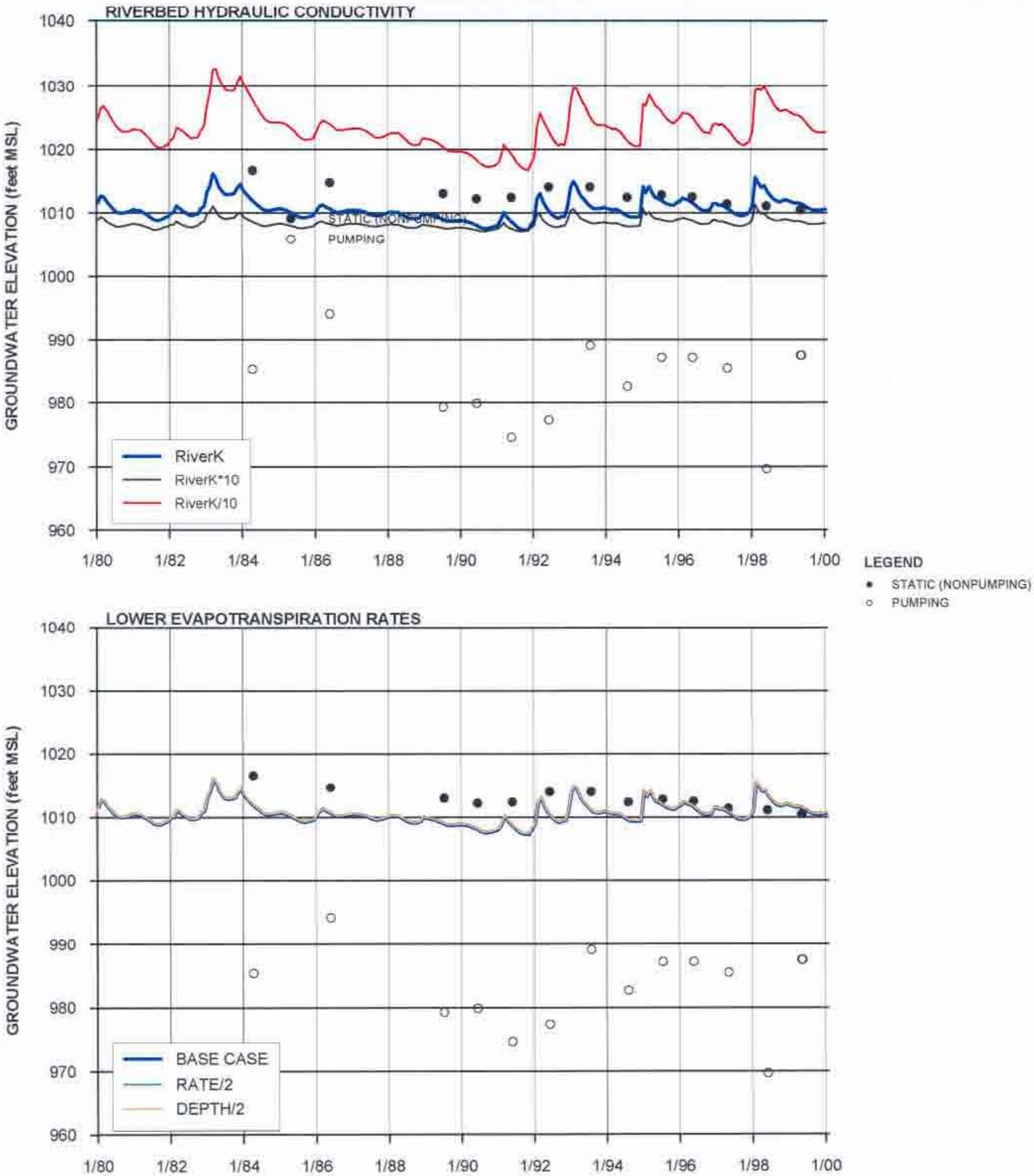


NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-44
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT NLF-B7 TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-332.GRF

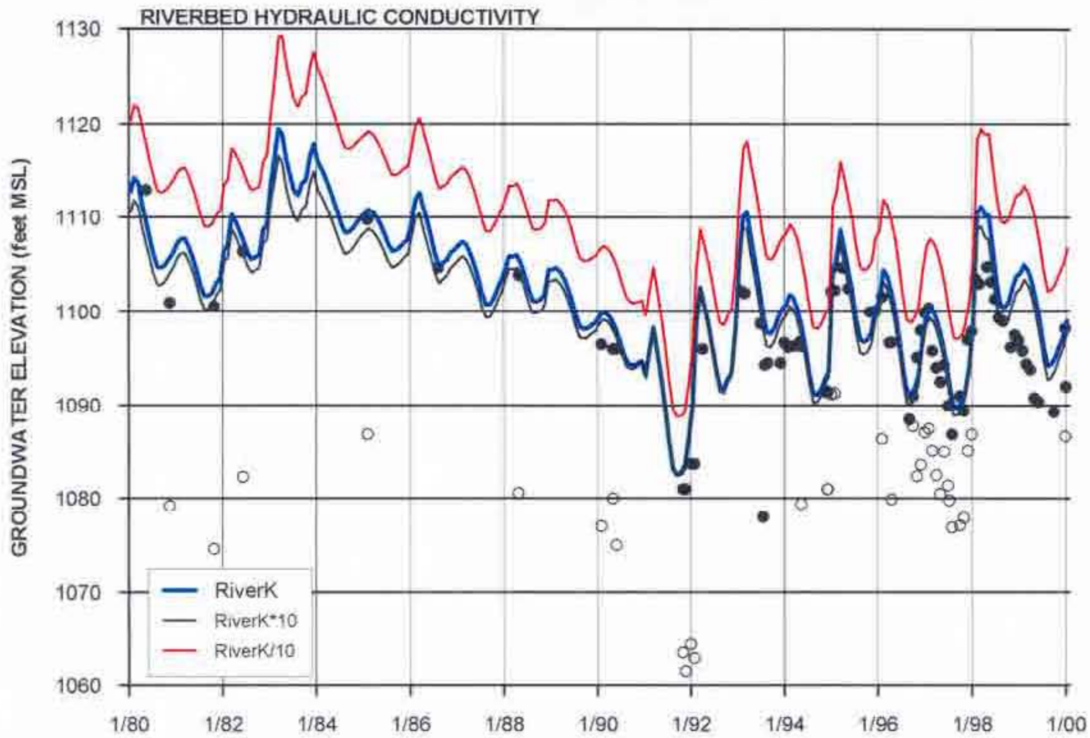


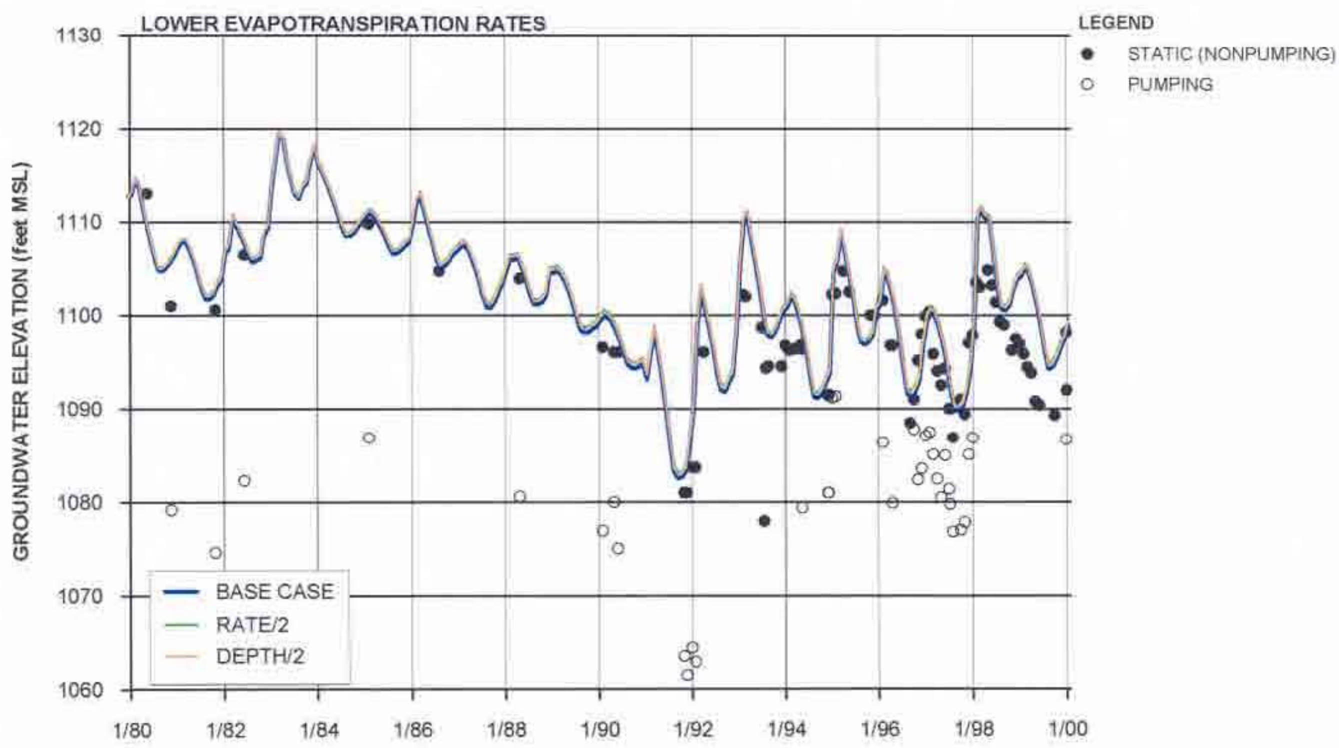
NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-45
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT NLF-G45 TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-333.GRF



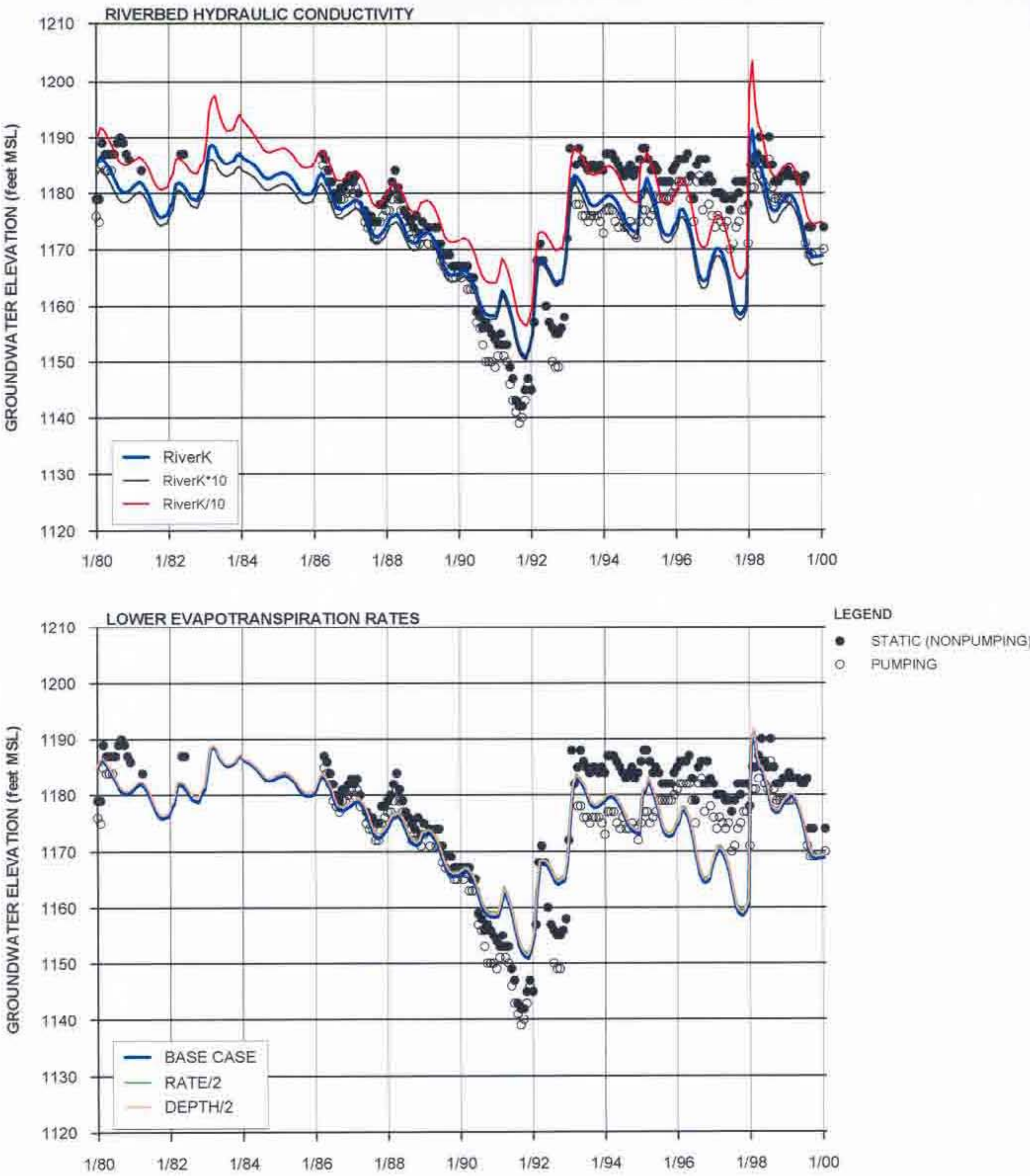


NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-46
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT VWC-N TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-334.GRF

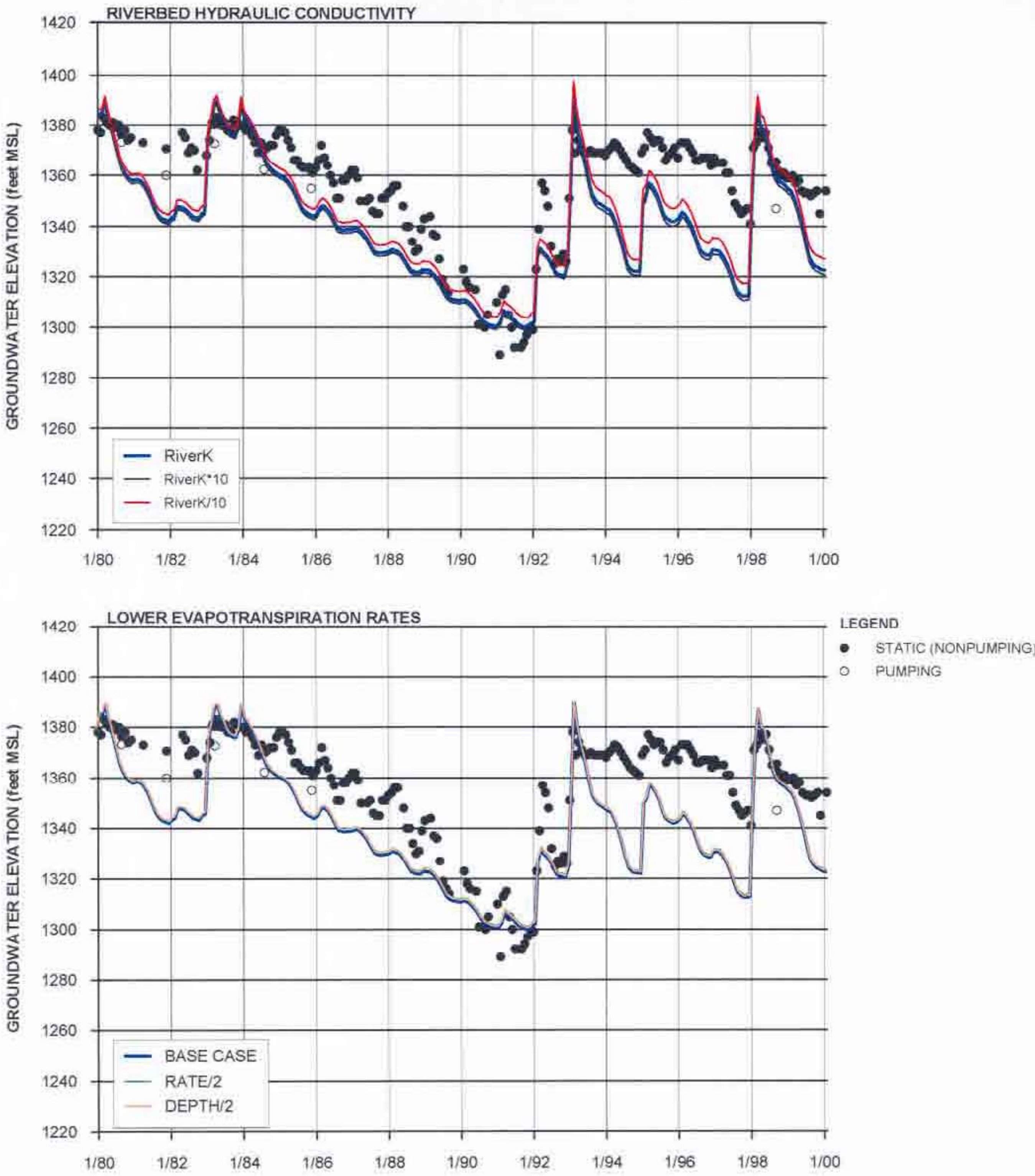


NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-47
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT SCWC-STADIUM TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-335.GRF

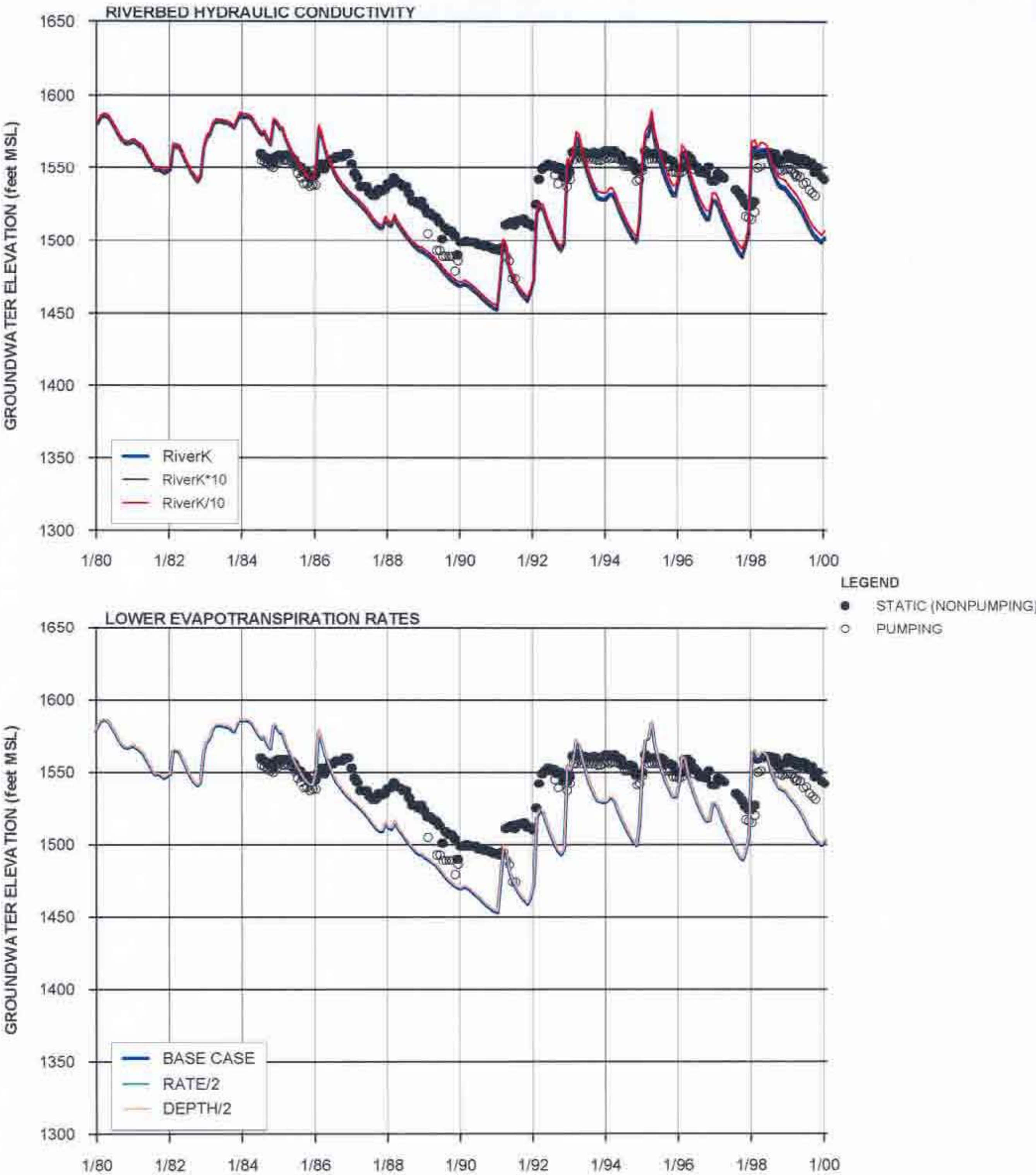


NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-48
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT SCWC-NORTH OAKS EAST TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-336.GRF

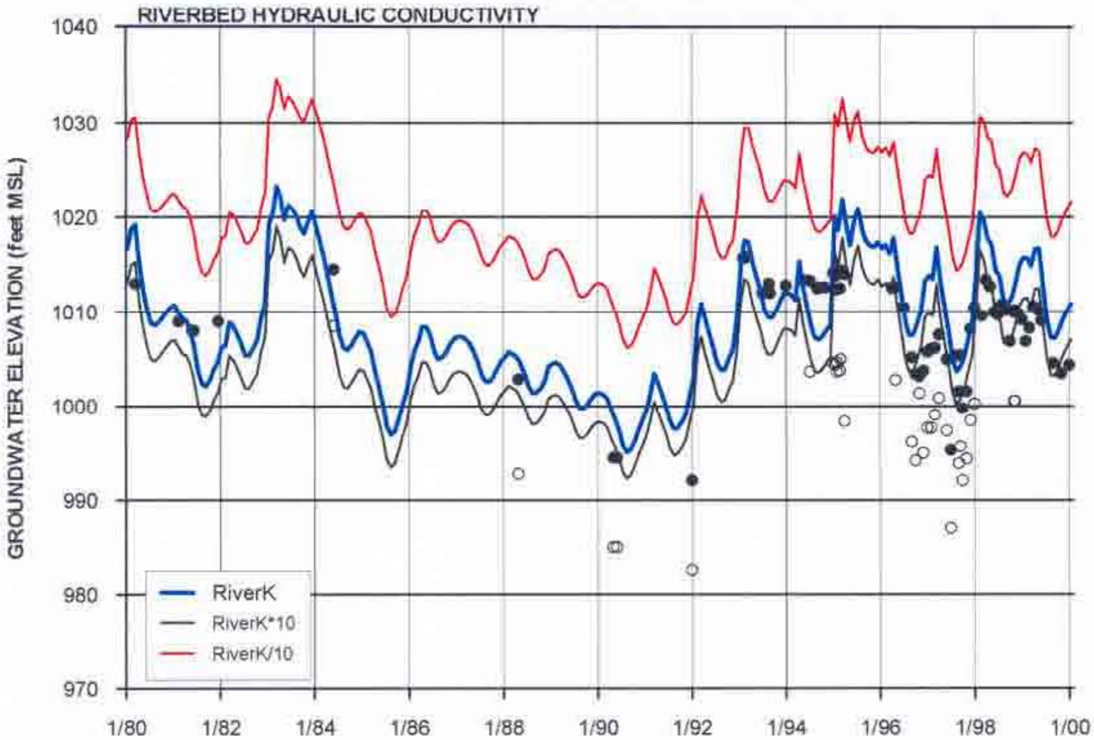


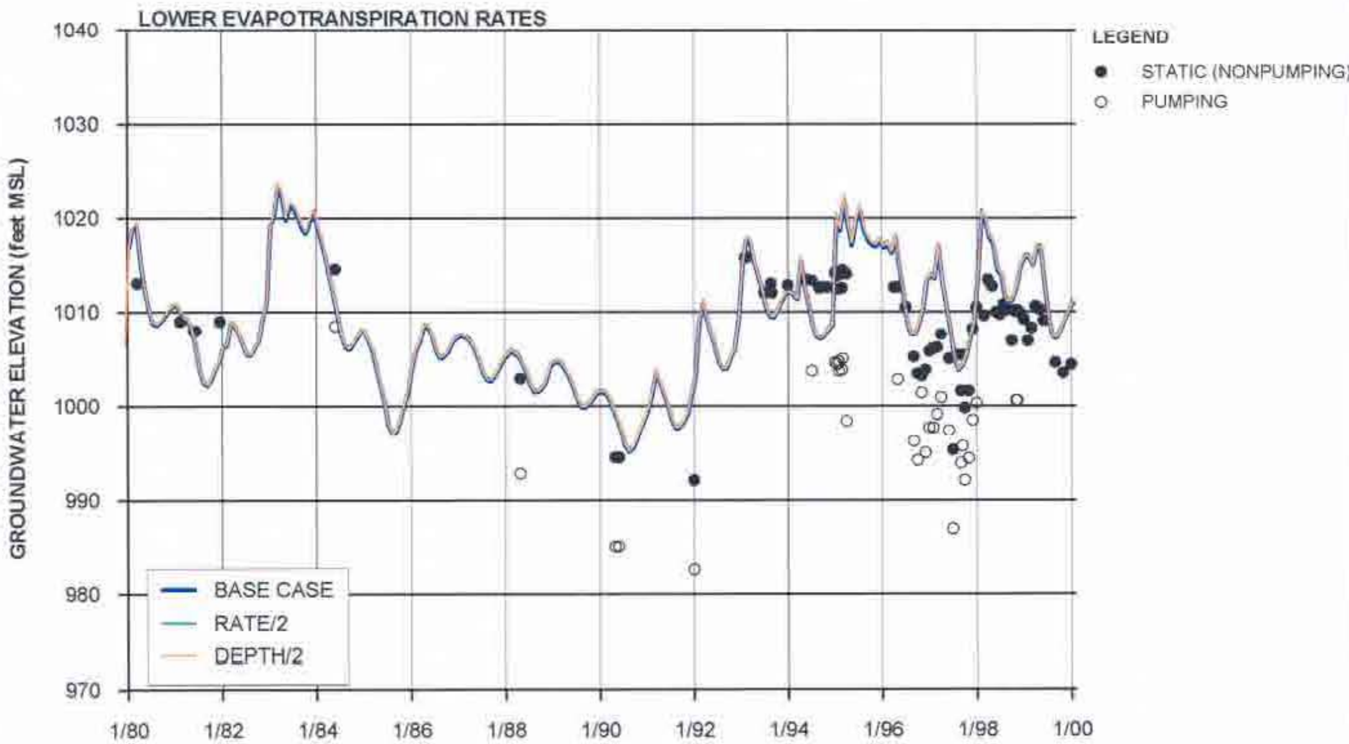
NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-49
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT SCWC-PINETREE1 TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-337.GRF





NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-50
SENSITIVITY OF ALLUVIAL GROUNDWATER ELEVATIONS AT VWC-D TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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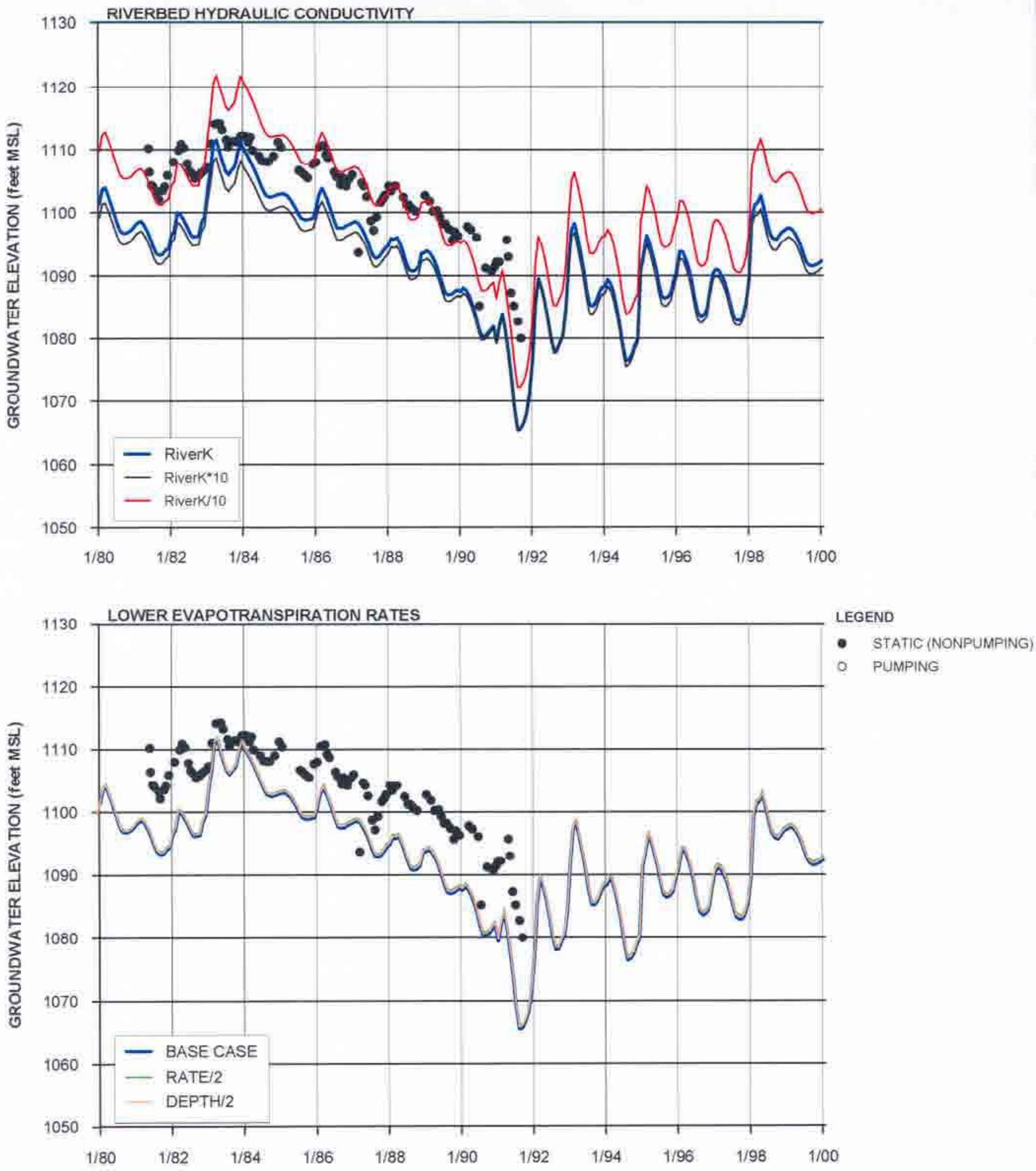

NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-51
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT 7048C TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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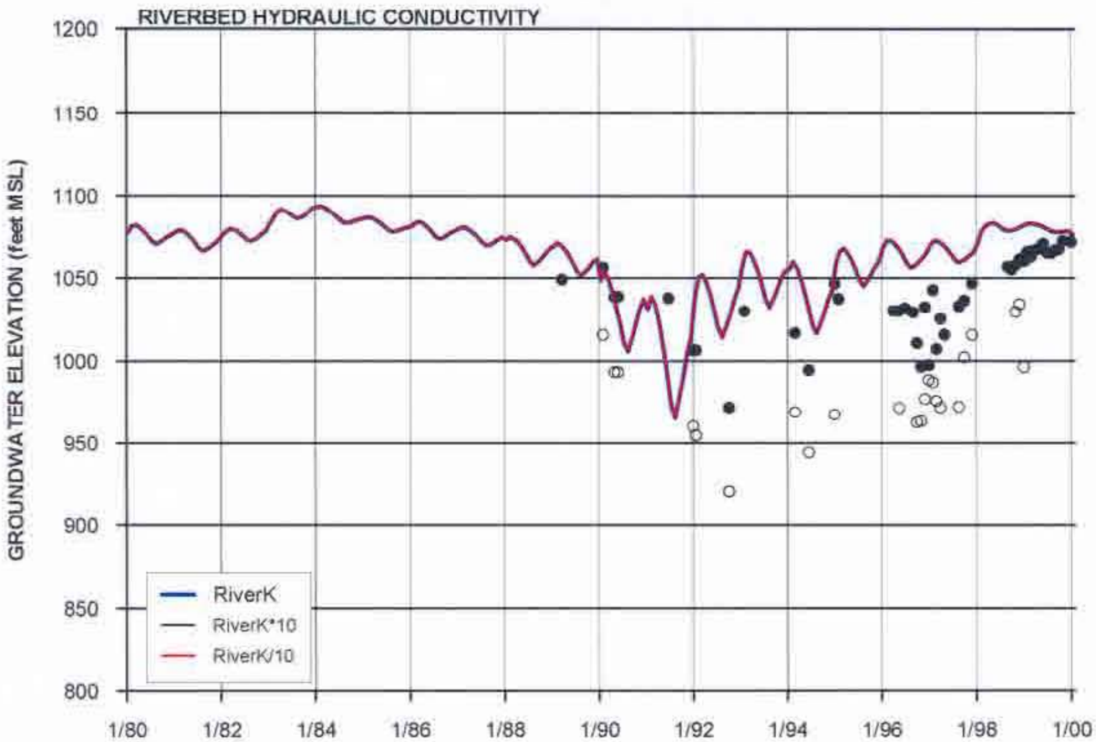

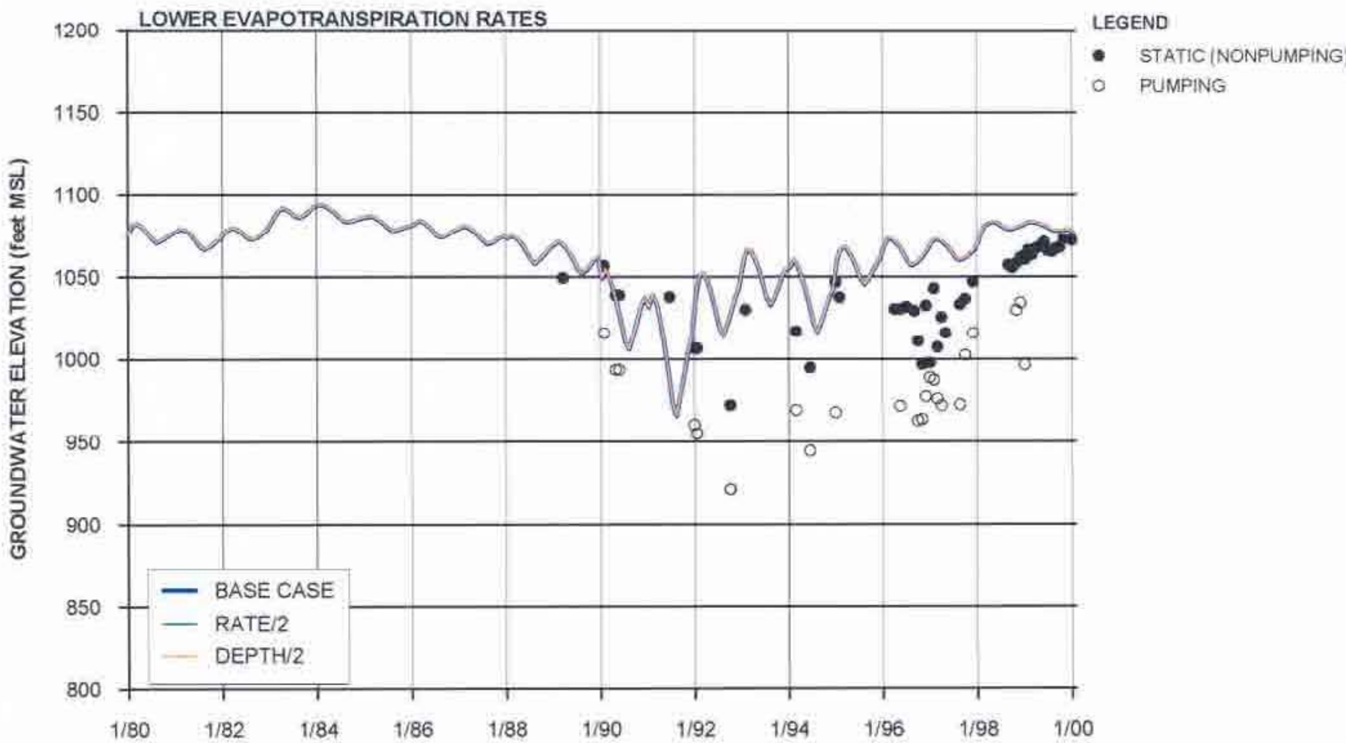

NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-52
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT VWC-201 TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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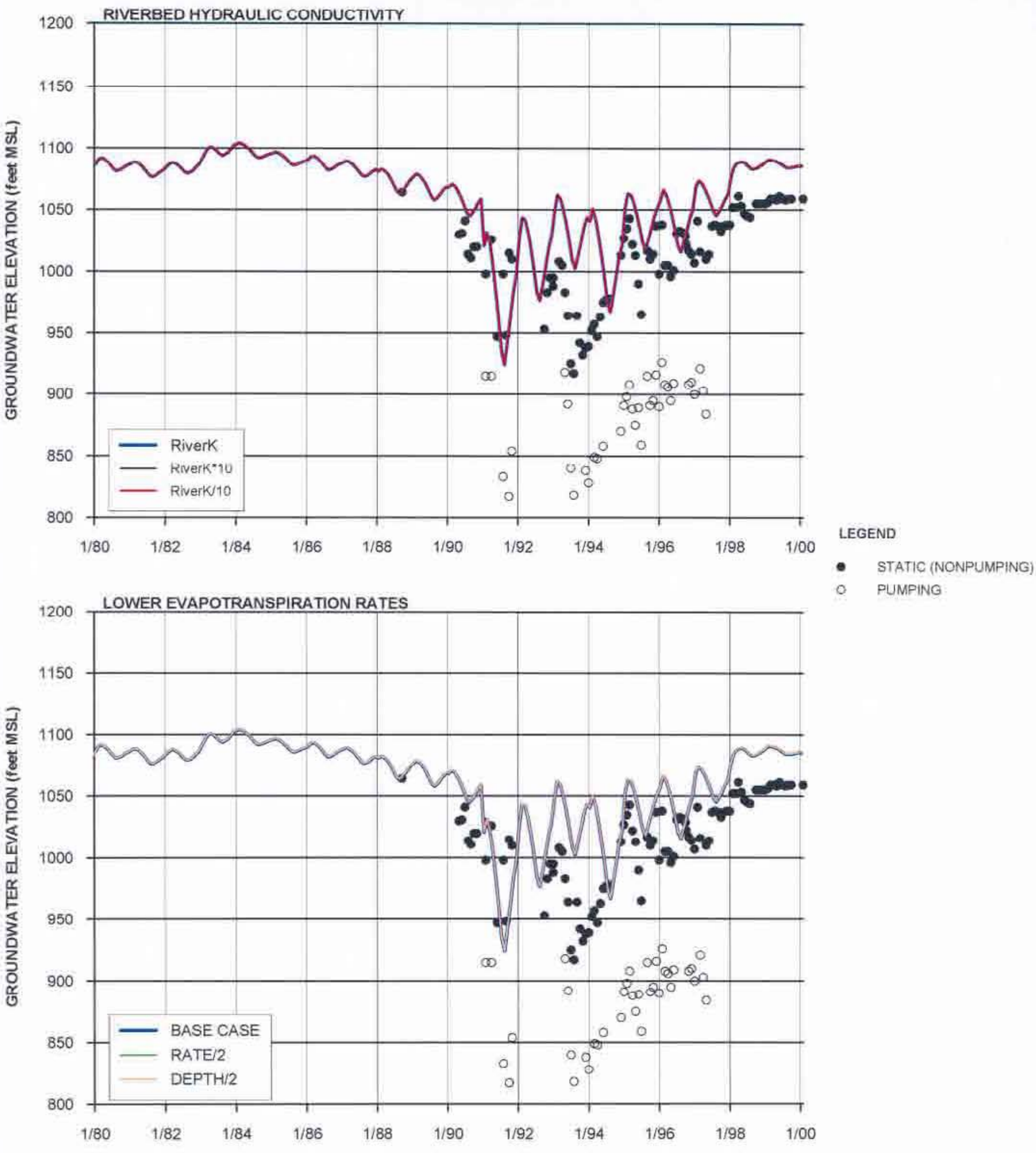

FIGURE 5-53
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT SCWC-SAUGUS 2 TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

CH2MHILL

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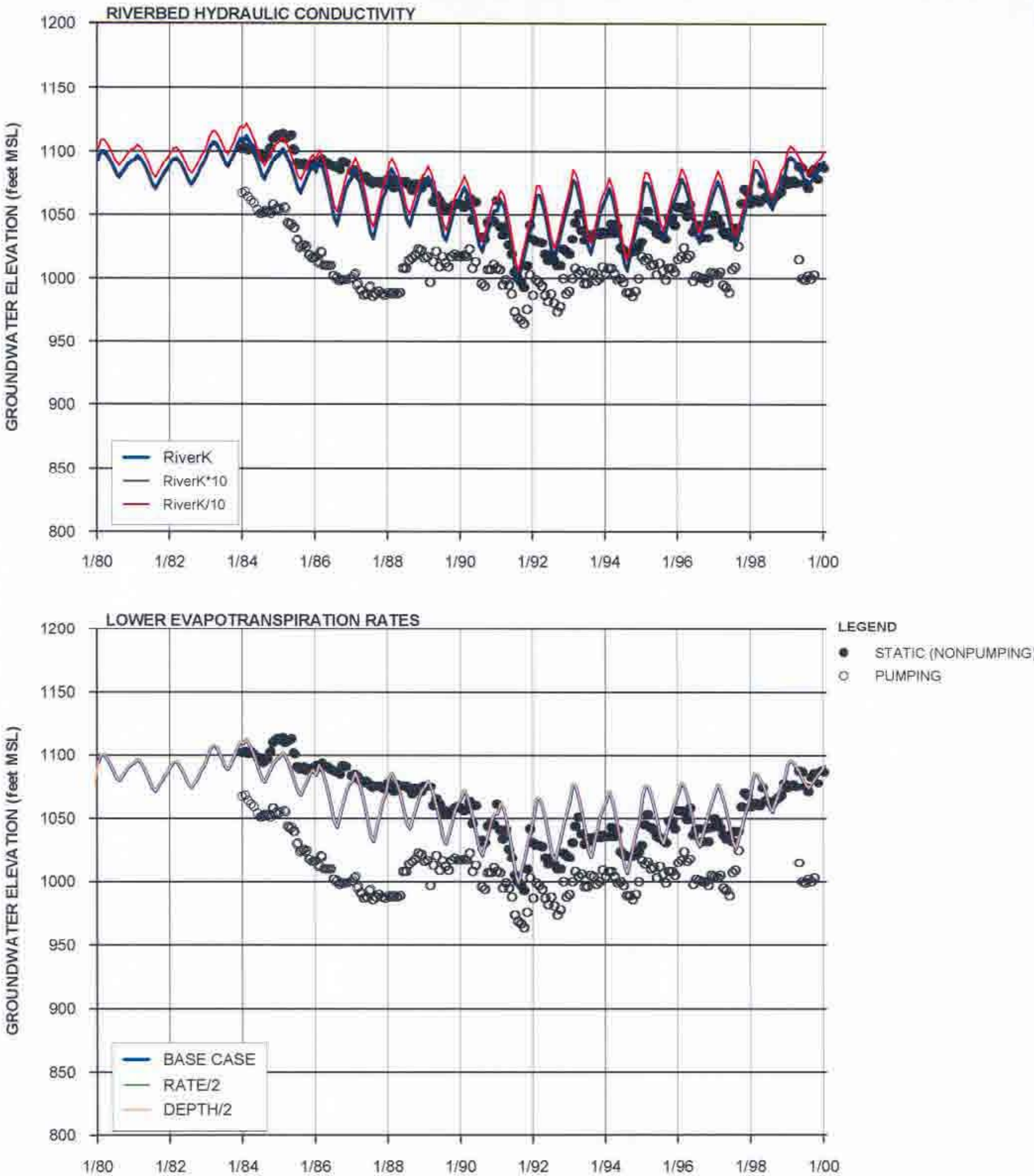

NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-54
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT NCWD-11 TO RIVER AND EVAPORTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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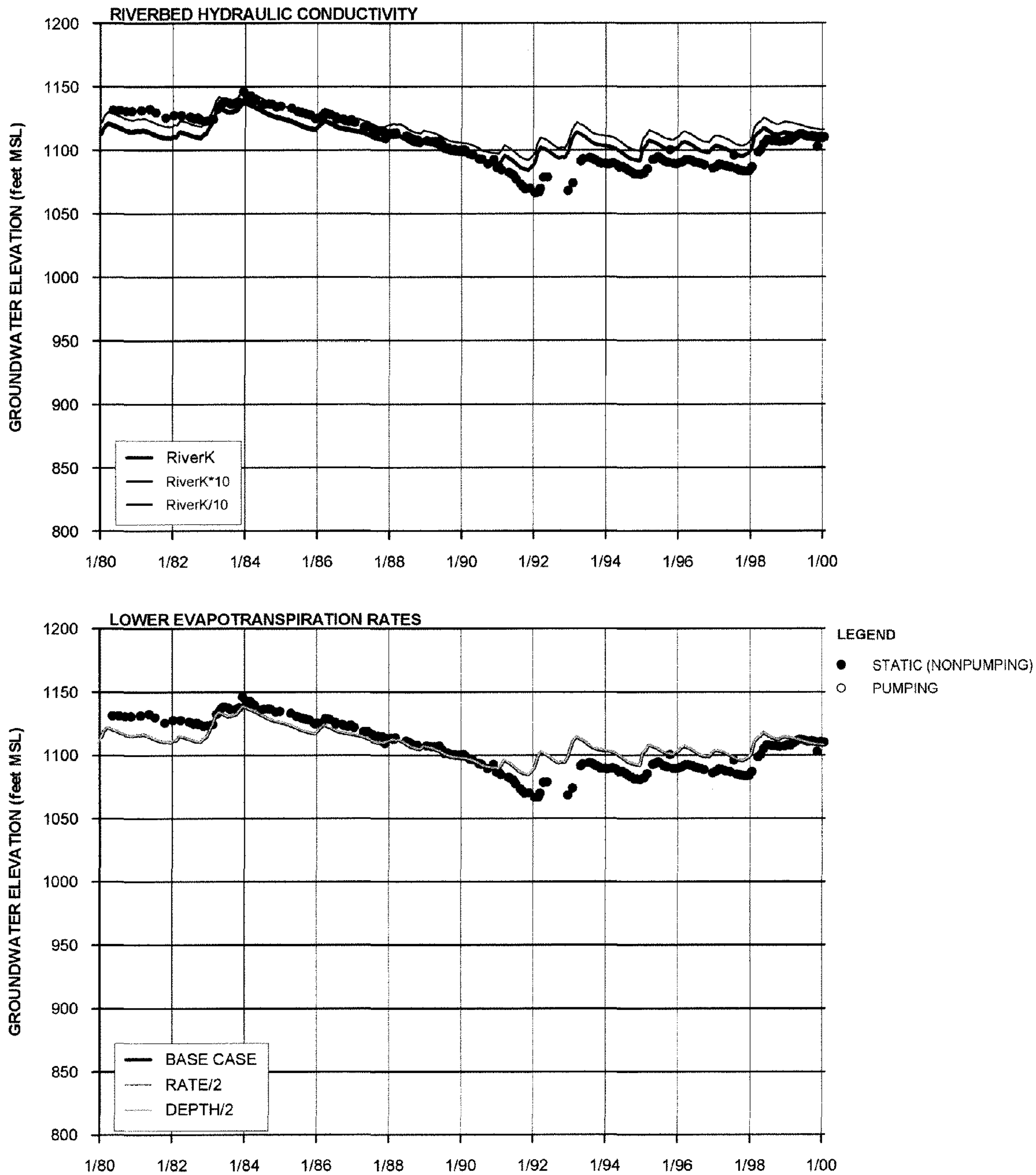

NOTES:
1. RiverK = RIVERBED VERTICAL HYDRAULIC CONDUCTIVITY
2. RATE = MAXIMUM RATE OF EVAPOTRANSPIRATION
3. DEPTH = ROOTING DEPTH (EXTINCTION DEPTH FOR EVAPOTRANSPIRATION)
4. SEE FIGURE 2-3 FOR LOCATIONS OF WELLS

FIGURE 5-55
SENSITIVITY OF SAUGUS GROUNDWATER ELEVATIONS AT 5851 TO RIVER AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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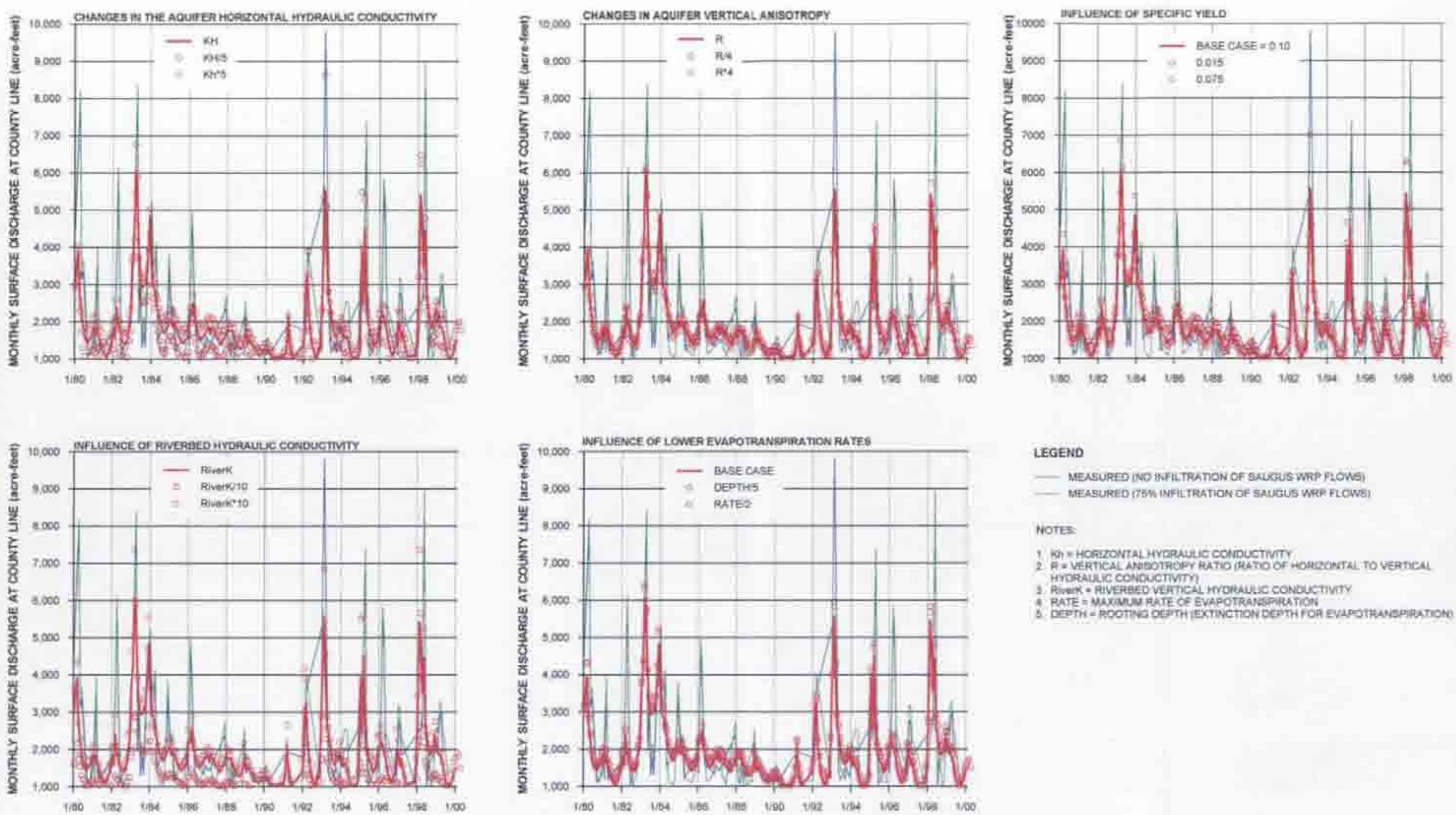

FIGURE 5-56
SENSITIVITY OF GROUNDWATER DISCHARGES TO THE SANTA CLARA RIVER TO AQUIFER, RIVER, AND EVAPOTRANSPIRATION PARAMETERS
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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SECTION 6

Model Applicability to Local Water Resource Management

The Purveyors have developed the Regional Model as the main computer tool for their use in ongoing management of the groundwater resources in the Santa Clarita Valley. Among the objectives in developing the model were (1) to be able to evaluate the long-term sustainability (yield) of the Alluvial and Saugus aquifer systems under a range of existing and potential future water resource management conditions, and (2) to facilitate general management of water quantity and water quality issues.

The Regional Model simulates groundwater flow in the two aquifers that are present in the Santa Clara River Valley East Groundwater Subbasin. It has been developed using the database and GIS that were developed by, and are being used by, the Purveyors to manage the valley's water resources. The modeling effort built upon previous and ongoing hydrogeologic studies in the valley (RCS, 1986, 1988, 2001, 2002; CH2M HILL, 2003), as well as previous modeling efforts (CH2M HILL, 1996, 2001, 2002). Key aspects of the Regional Model's construction and calibration include the following:

a. The Regional Model covers the entire Santa Clara River Valley East Groundwater Subbasin, from the Lang stream gage, at the eastern end of the valley, to Blue Cut, just west of the county line.

b. The Regional Model includes the SWRM, which determines the monthly volume of rainfall that is available to streams that are tributaries to the Santa Clara River. The SWRM also computes how much of the runoff can recharge the Alluvial Aquifer, the locations of the recharge, and the amount of flow that remains in each stream. Further, the SWRM calculates how much flow occurs in the Santa Clara River due to tributary inflows and to WRP discharges. Together, the SWRM and the Regional Model allow for estimation of the time-varying magnitudes of total river flow and groundwater discharges to the river. In summary, the Regional Model is actually a groundwater flow model coupled with an empirical tool that estimates stormwater generation from each watershed lying upstream of, and extending into, the Regional Model's boundaries.

c. The Regional Model has been calibrated on a monthly basis to time-varying hydrologic conditions that were observed from 1980 through 1999. Calibration data consisted of groundwater elevations in both aquifers at production and monitoring wells; estimated fluctuations in groundwater discharges to the Santa Clara River; and gaged flows in the Santa Clara River. Consequently, the Regional Model is calibrated not only to groundwater elevation trends, but also to the flows of water into and out of the valley.

The Regional Model has been specifically designed for use in managing groundwater resources on a local and regional scale. Its design and calibration make it a useful tool for:

a. Evaluating groundwater management strategies, including analyzing basin operations over multi-year wet/dry cycles

b. Evaluating ASR projects or other aquifer recharge projects

c. Evaluating options for locating new or proposed water supply wells, with consideration of the avoidance and management of any contamination in the aquifer system

d. Evaluating the restoration of pumping capacity that has been impacted by perchlorate contamination in the vicinity of the Whittaker-Bermite property in the central part of the valley

Nonetheless, because no model is perfect, it should be used with care, and all model results should be examined by qualified and experienced hydrogeologists and water resource managers. Specific recommendations for the continued use and maintenance of this tool, including hydrogeologic data needs, are as follows:

a. Future predictive modeling activities should include sensitivity analyses on key model variables, particularly the Kh and Kv of both aquifer systems. This recommendation is based on the sensitivity analysis results, which show that groundwater elevations and groundwater discharge to the Santa Clara River are both sensitive to these parameters.

b. Streamflow monitoring should resume at the Lang gage, to better understand the magnitudes and timing of Santa Clara River flows into the valley. Stream gaging was discontinued at this location after October 1989. Because inflow in the Santa Clara River is one of the principal sources of water, the absence of data at this location is likely the primary reason that the Regional Model has difficulties simulating historical water level trends during certain periods at wells in the eastern-most portion of the valley. Without data from the Lang gage, simulations of future water level trends in this area will be uncertain, due to the Regional Model's tendency to under-predict groundwater elevations during drought periods.

c. The Regional Model and the SWRM should both be updated as water use conditions change in the future. Specific activities that merit updates to these tools include the planned implementation of recycled water use in the valley, continued urbanization in currently undeveloped and agricultural lands, and the increasing import of SWP water in response to increasing urban water demands.

d. Transient calibration runs should eventually be performed to test the transient model's ability to simulate conditions after 1999. The success of this activity will be more likely if streamflow data are collected at the Lang gage.

e. The Regional Model's calibration in the Saugus Formation should be tested whenever new wells are completed in this aquifer. Specifically, long-term water level monitoring should commence in these wells, and controlled pumping tests should be conducted to provide quantitative estimates of aquifer properties at new well locations, particularly in areas where wells have not been previously constructed.

f. Other activities described in the MOU between Ventura County and the Purveyors should continue, in order to provide data that can be used to improve the Regional Model and management of the local water resources. These data include pumping, rainfall, WRP discharge, streamflow, and groundwater elevation information. In particular, the groundwater elevation monitoring program that has been conducted for the past several years at production and monitoring wells should continue. Data from this program, collected by the Purveyors and LACFCD, provide valuable information for identifying and understanding the changes that occur in the hydrologic system, including the relationships between groundwater and surface water.

SECTION 7

References

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Memorandum of Understanding
Between the
Santa Clara River Valley
Upper Basin Water Purveyors and
United Water Conservation District

August 2001

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into effective August 20, 2001, by and among Castaic Lake Water Agency ("CLWA"), CLWA's Santa Clarita Water Division ("SCWC"), Newhall County Water District ("NCWD"), Valencia Water Company ("VWC") and Los Angeles County Waterworks District No. 36 ("LACWD"), which are collectively referred to as the "Upper Basin Water Purveyors" and United Water Conservation District "UWCD", hereinafter referred together as the "parties."

RECITALS

WHEREAS, UWCD is a public agency that encompasses approximately 214,000 acres of land located in central Ventura County. UWCD's service area covers the downstream portion of the Santa Clara River Valley in Ventura County, as well as the Oxnard Plain (sometimes referred to as the "Lower Santa Clara River Area"). UWCD manages surface and groundwater resources within seven groundwater basins in the Lower Santa Clara River Valley Area. UWCD's Boundary is shown on Figure 1-1; and,

WHEREAS, the Upper Basin Water Purveyors meet regularly as a technical group to coordinate conjunctive use of imported, recycled and groundwater resources of the water basins east of the Los Angeles/ Ventura County line (sometimes referred to as the "Upper Santa Clara River Area"), which is located almost entirely within northwestern Los Angeles County. The respective services areas of the Upper Basin Water Purveyors members (CLWA, SCWC, NCWD, VWC and LACWD) are shown on Figure 1-2; and,

WHEREAS, UWCD has been involved in the review of water resources in both the Lower Santa Clara River Area and also the Upper Santa Clara River Area as part of UWCD's review of the Newhall Ranch Specific Plan and EIR (NRSP); and,

WHEREAS, litigation of the Newhall Ranch Specific Plan and EIR resulted in preparation of an additional analysis to the previously certified EIR for the NRSP, including the section addressing water resource issues; and,

WHEREAS, the Additional Analysis includes a water flow model and impact analyses of the future water usage projections for the Upper Santa Clara River Area; and,

WHEREAS, UWCD, Newhall Land and Farming Company (NLF) and others have had several technical meetings to further study the Additional Analysis as it relates to the water issues, and, based on this information, and further discussions between UWCD and the Upper Basin Water Purveyors, UWCD believes that it is in the best interests of the parties and the future beneficial water resources management in the upper and lower basins to enter into a cooperative working relationship among the parties; and,

WHEREAS, the parties have determined that this MOU is the best format for establishing a program that would be implemented over time for purposes of agreeing upon overall water resources management techniques and an information database that would benefit the upper and lower basins; and,

WHEREAS, this MOU is prepared by UWCD and the Upper Basin Water Purveyors because the parties believe that a cooperative water resource monitoring program in the Upper and Lower Santa Clara River Areas is desirable to protect and enhance the conjunctive use of imported water, groundwater and surface water resources within the region; and,

WHEREAS, the parties support regional water planning efforts that rely on the provision of accurate and timely information about available water resources; and,

WHEREAS, the parties to this MOU desire to create and maintain a cooperative relationship for purposes of gathering information for UWCD and the Upper Basin Water Purveyors to be used in further assessing imported water, surface water and groundwater conditions in both the Upper and Lower Santa Clara River Areas; and,

WHEREAS, the parties to this MOU intend to form a reciprocal relationship. In order to do this, UWCD will designate an individual or individuals with technical knowledge and experience appointed by the General Manager of UWCD who will be included in discussions and efforts that take place with the Upper Basin Water Purveyors and others regarding the Upper Santa Clara River Area. Likewise, the Upper Basin Water Purveyors will designate an individual or individuals with technical knowledge and experience appointed by the General Managers of the Upper Basin Purveyors who will be included in discussions and efforts with UWCD and others regarding the Lower Santa Clara River Area, and,

WHEREAS, the goal of the MOU is to establish a joint monitoring program, which includes: (a) data collection (monitoring and testing); (b) database management; (c) groundwater flow modeling; (d) assessment of groundwater basin conditions (operational yield); and (e) report preparation and presentation.

NOW, THEREFORE, in consideration of the mutual promises and covenants herein contained, the parties to this MOU agree as follows:

1.1 **Program Monitoring.** The parties will participate in a joint monitoring program.

1.2 **Program Content.** The technical aspects of this joint monitoring program are set forth in a technical memorandum entitled, "Water Resource Monitoring Program Upper Santa Clara River Area," (Program) which is attached as Exhibit 1 and incorporated by this reference.

1.3 **Program Meetings.** The General Manager or President of each party to this MOU (or their designee) shall meet as the "Program Committee" within 30 days of the execution of this MOU. The "Program Committee" will establish appropriate subcommittees to initiate the Program and determine the meeting times and locations for the committees. The Program Committee and subcommittees will discuss and coordinate technical aspects of the Program, including the gathering, interpretation and reporting of information as outlined in the technical memorandum (Exhibit 1). Other attendees may be permitted by agreement of the parties to this MOU.

1.4 **Monitoring Costs.** The costs incurred in administrating the Monitoring Program will be determined as implementation of the Program takes place. However, it is understood that, unless the parties to this MOU agree otherwise, the Upper River monitoring costs of the program will be borne by the Upper Basin Water Purveyors because such monitoring will take place within their service areas and the Lower River monitoring costs of the program will be borne by UWCD because such monitoring will take place within its service area.

1.5 **Program Implementation.** The parties to this MOU have prepared a schedule, attached as Exhibit 2, that describes the tasks and estimated time to implement the Program. The Parties acknowledge that Program Implementation will be an on-going and evolving process and may change due to future amendments to the Program, challenging technical issues or other unforeseen circumstances.

1.6 **Water Rights.** Notwithstanding the provisions of this MOU, nothing in either this MOU or the technical memorandum (Exhibit 1) shall be construed as affecting the water rights or operations of any party, person or entity.

1.7 **Term.** This MOU shall remain in effect for an initial period of seven (7) years and shall be automatically renewed for additional one year increments unless otherwise unanimously terminated by the members of the Program Committee as that committee exists at the time action is taken to terminate this MOU.

1.8 **Counterparts.** This MOU may be executed in any number of counterparts, each of which, when so executed, will be deemed to be an original and all of which taken together will constitute one and the same agreement.

IN WITNESS WHEREOF, the parties have executed this MOU as of the date first set forth above.

United Water Conservation District

By ______________________
General Manager

Castaie Lake Water Agency

By ______________________
General Manager

Newhall County Water District

By ______________________
General Manager

Valencia Water Company

By ______________________
President

Santa Clarita Water Company

By ______________________
President

Los Angeles County Waterworks District No. 36

By ______________________
County of Los Angeles

United Water Conservation District Boundary

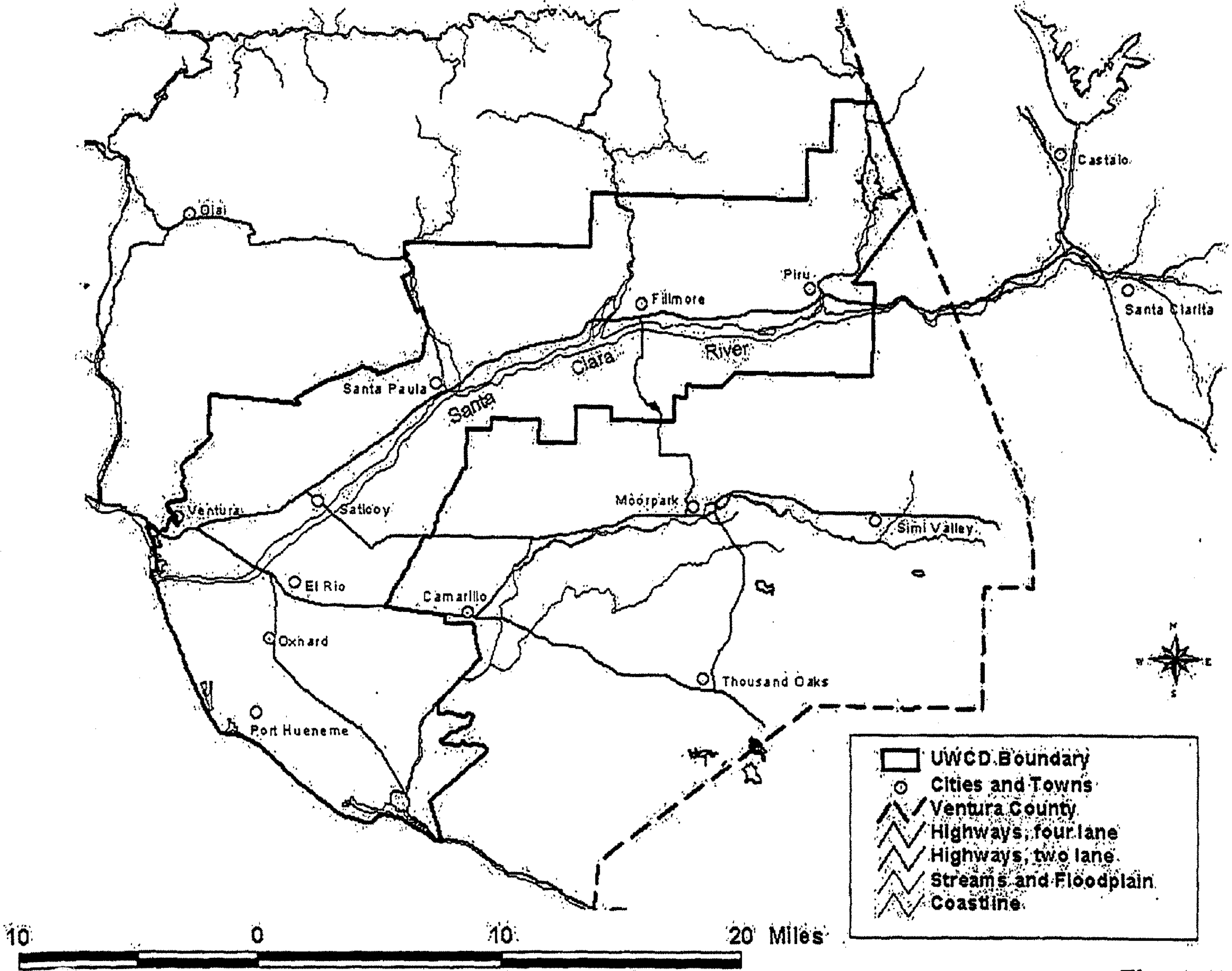


Figure 1-1

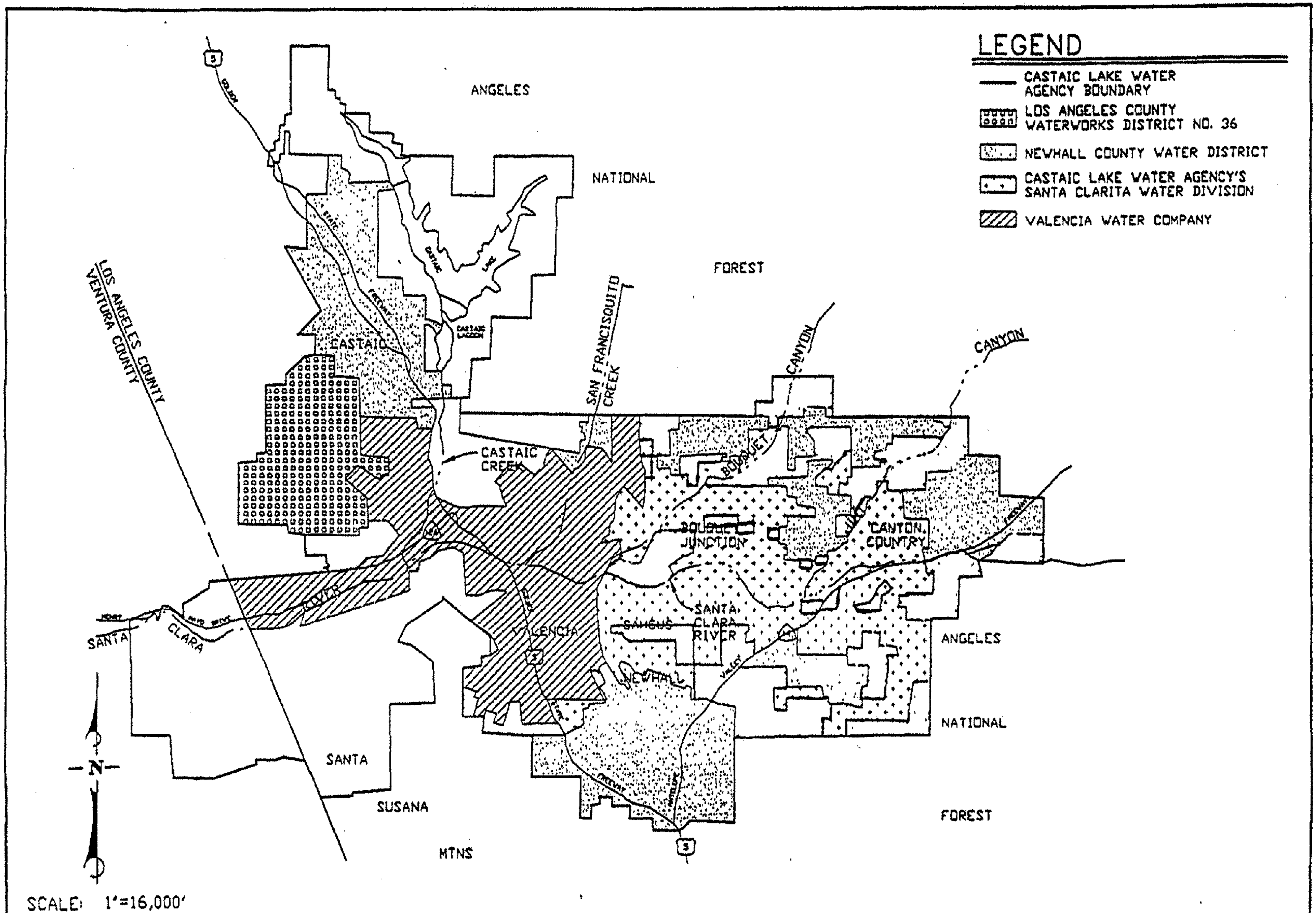


FIGURE 1-2

CLWA AND WATER PURVEYOR SERVICE AREAS

Exhibit 1
WATER RESOURCE MONITORING PROGRAM
UPPER SANTA CLARA RIVER AREA

INTRODUCTION

As part of its ongoing monitoring, interpretation, and reporting on imported water supplies and groundwater conditions in the aquifer systems underlying the Upper Santa Clara River Area, generally east of the Los Angeles County - Ventura County line and extending east to about the vicinity of Lang Station, the principal water purveyors in the area (primarily the municipal water purveyors - Castaic Lake Water Agency, Los Angeles County Waterworks District No. 36, Newhall County Water District, and Valencia Water Company) have committed to formalizing the data base on which water supply conditions are analyzed, and expanding the analysis of groundwater conditions such that the adequacy of water supply is well understood, and that both local and regional questions or issues about surface and groundwater can be addressed.

This water monitoring program outline has been prepared as a cooperative effort by the Upper Basin Water Purveyors operating in the Santa Clarita Valley and by the United Water Conservation District in Ventura County, the latter as the primary groundwater resource management entity in the Lower Santa Clara River Area (west of the Los Angeles - Ventura County line). The intent of the program outline is to delineate a series of elements that will be undertaken primarily by the Upper River Area entities, but in cooperation with United such that there is ultimately an integrated and coordinated data base, as well as agreed-upon technical tools such as a numerical groundwater flow model, to allow a continued regional understanding of water resources along the Santa Clara River. In that light, the following program includes elements which address data collection (monitoring and testing), database management, groundwater modeling, operational yield analyses, and report preparation and presentation.

DATA COLLECTION (MONITORING AND TESTING)

Historically, data on groundwater and related hydrologic conditions have been collected on varying frequencies and in varying formats throughout the Upper River Area. Fortunately, more than sufficient data have historically been collected on groundwater levels, quality, and production (pumpage) to permit general assessment of groundwater conditions, in some detail in the widely developed Alluvial aquifer and to a lesser extent the Saugus Formation aquifer. In order to expand on the general assessment of groundwater conditions, historical data collection efforts will be updated and formalized in the following areas.

Groundwater Levels and Quality - Wells in which historical and current water level data are available will be "qualified" (to confirm locations, depths, well completion details, annular seals, etc.) to confirm their utility for ongoing monitoring of water level and/or water quality in a particular aquifer. Based on a combination of qualified well details and available historical and current data, a network of existing and future wells will be developed for ongoing monitoring of groundwater levels (initially on a semi-annual frequency) and groundwater quality (initially on an annual to triennial frequency, depending on the use of the well) in both the Alluvium and the Saugus Formation aquifers. The water level and water quality monitoring networks may not be identical (as with most basins, the number of water level monitoring points will likely be greater than the number of water quality monitoring points). Also, in light of the relative differences in development of the two aquifer systems, there will be more monitoring points in the Alluvium than in the Saugus. However, as future development of the Saugus increases, particularly as the spatial extent of the Saugus "well field" expands, the Saugus monitoring network will evolve and expand accordingly. Water quality details are expected to begin with what historical analyses have been made; monitored details are expected to increase as the use of local Groundwater continues to change from irrigation supply to municipal supply, with the addition of organic and other hazardous chemical analyses of drinking water supplies in recent years. Finally, such as any dedicated monitoring wells are installed in the area, for specific site investigation or other purposes, they will be added to the qualified well network as appropriate.

Groundwater Pumpage - Essentially all pumpage in the Upper Area (except small capacity individual domestic and similar wells) is metered or directly estimated from electrical power records, and the results are maintained in a decentralized data base. Metered measurement of all substantial capacity wells (all municipal and agricultural, as well as other private wells, e.g. golf course irrigation wells) will be continued on at least an annual basis, with progression to monthly data collection as appropriate for particular analyses that may be undertaken.

Surface Water Flows and Quality - Historical stream gage sites will be preserved as possible to allow ongoing surface water gaging of stream inflows to the Upper River area, stream outflows from the Upper River area into Ventura County, and return flows to the River system from in-area wastewater treatment plant discharges. Surface water quality at the same points will also be sampled on some frequency to continue historical records as appropriate or to document episodic or other (e.g. treated wastewater discharges) surface water flows into or out of the Upper River area.

Well and Aquifer Characteristics - Recently constructed wells, in both the Alluvium and Saugus Formation, have been tested, in some cases with the benefit of nearby monitoring wells, to determine well yields and aquifer hydraulic properties (e.g. transmissivity and storage coefficient). In limited cases, production logging and depth-specific water quality sampling has been undertaken to examine variations in aquifer productivity and quality with depth. Such as there is a need for additional spatial or vertical distribution of well yield or aquifer characteristic data, selected qualified wells will be tested in the Alluvium and Saugus aquifers. In general, all new production wells will be tested to determine the yields of the wells and the hydraulic characteristics of the aquifer materials in which they are completed at various locations in the Upper River area.

Precipitation - The locations of historical precipitation gaging will be verified and the quality of the gaging stations will be assessed. Continuation of historical gaging will be a primary goal, with additions as appropriate to assess inflow of water within the Upper River area as well as distribution of precipitation throughout the area.

DATABASE MANAGEMENT

Geographic Information System - There is a good start on a regional GIS from the US Geological Survey's Regional Aquifer Study. For instance, roads, streams and other basic geographic features are in the USGS GIS that has been maintained and expanded by United Water Conservation District. United has commercial digital air photo coverage of Ventura County that includes a small portion of western Los Angeles County; additional digital imagery will be sought from agencies in Los Angeles County.

Most of the wells in the Valencia/Santa Clarita area are also in a USGS GIS coverage that includes well construction information. The wells are identified by owners designations as well as state well number. By using the state well number in identifying all monitoring data, information from the databases can be linked directly to the GIS well coverage.

Water Level Database - Monitoring data will be collected together in common databases, using an easily accessible program such as Microsoft Access. Groundwater level information is presently in a variety of forms, including paper copy, spreadsheet files, and agency databases. The digital information will be incorporated into a master database, but the data on paper copies will have to be entered into a computer. This will be accomplished by prioritizing the order in which this information is entered. Historic groundwater level data will be obtained from as many wells as possible, public and private, to ensure meaningful area coverage.

Water Quality Database - Water quality information may be a larger chore to organize in a database than water levels because each water sample collected is commonly analyzed for a large number of constituents. For water quality data collected in the future, analytical labs can provide results in digital form for ease of integration into a database. Historical water quality information is available digitally from the California Department of Health Services for public water supply wells (data is available for about the past ten years). For the rest of the historical water quality data, prioritizing the order of manual data entry would be necessary. Constituents of concern are obviously the first to be entered. Whether to enter all historical data will need to be addressed; this information is valuable in identifying long-term trends, but data entry takes time. United Water now has all historic water quality data for seven basins in Ventura County in a database, but it took several years to do this.

Water quality data from surface sources such as streams will also be included in the main water quality database. A location identifier can be used to tie the sample to the monitoring location in a GIS coverage. The approximate flow of the surface water source at the time of measurement should accompany each water quality data entry.

Pumpage Database - Pumpage data from individual wells is key to assessing both water level and water quality trends. This information is also required to construct a groundwater model. Some of this information has already been entered in computer files and can be readily imported into a database. Other information will likely have to be obtained on a cooperative basis. If pumpers do not have their own metered pumping records, pumpage will be estimated from other sources such as utility bills. For wells where no records have been kept, probable pumping quantities can be estimated through land use records and, in the case of irrigated agriculture, from irrigation methods and practices. This calculated information should not be entered directly in the pumpage database.

Streamflow Database - There should be a database of streamflow measured at various monitoring points. For USGS gauges, much of this information is already in digital form. Other agencies, such as County Flood Control, may also have digital data.

GROUNDWATER FLOW MODELING

As part of the technical analysis of water supply alternatives to meet projected water demands of the proposed Newhall Ranch project in the Upper River area, a numerical groundwater flow model was prepared for that project's proponent. That model was developed to focus on the feasibility and impacts of a potential storage and recovery project in the Saugus Formation, including the impacts of injection and recovery pumping in the Saugus on the overlying Alluvium, and the resultant impacts on Santa Clara River flows out of the Upper River area. The current model is calibrated for a steady state condition, including the addition of some focused injection and pumping. As a result, it represents a useful initial modeling effort of the overall aquifer system in the Upper River area. Depending on its availability for other uses in the Upper River area, that initial model will be subjected to transient calibration efforts and additional calibration of the Alluvial aquifer. The model will then become an evolving tool for analysis of ongoing groundwater development and recharge, in conjunction with imported surface water, and the resultant impacts on groundwater conditions in the Upper River area, as well as on surface outflows to the downstream basins on the Santa Clara River.

OPERATIONAL YIELD OF THE BASIN

A primary objective of the monitoring efforts, database management efforts, and modeling efforts described above is to assess groundwater basin conditions in the Upper River area in the context of the long term sustainability of the Alluvium aquifer and the generally underlying Saugus Formation, and to operate the basin such that the operating yield is not exceeded over a multi-year wet/dry cycle. This operational yield includes flexibility of groundwater use by allowing increased groundwater use during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is available. The operational yield protects the aquifer by assuring that groundwater supplies are adequately replenished from one wet/dry cycle to the next. Historical groundwater data demonstrates that the Alluvium has been, and continues to be developed within its long-term sustainability (i.e. no

chronic lowering of water levels, no notable trend toward degradation of groundwater quality, etc.). Limited historical data in the Saugus Formation shows no lowering of water levels or degradation of water quality where it has been developed.

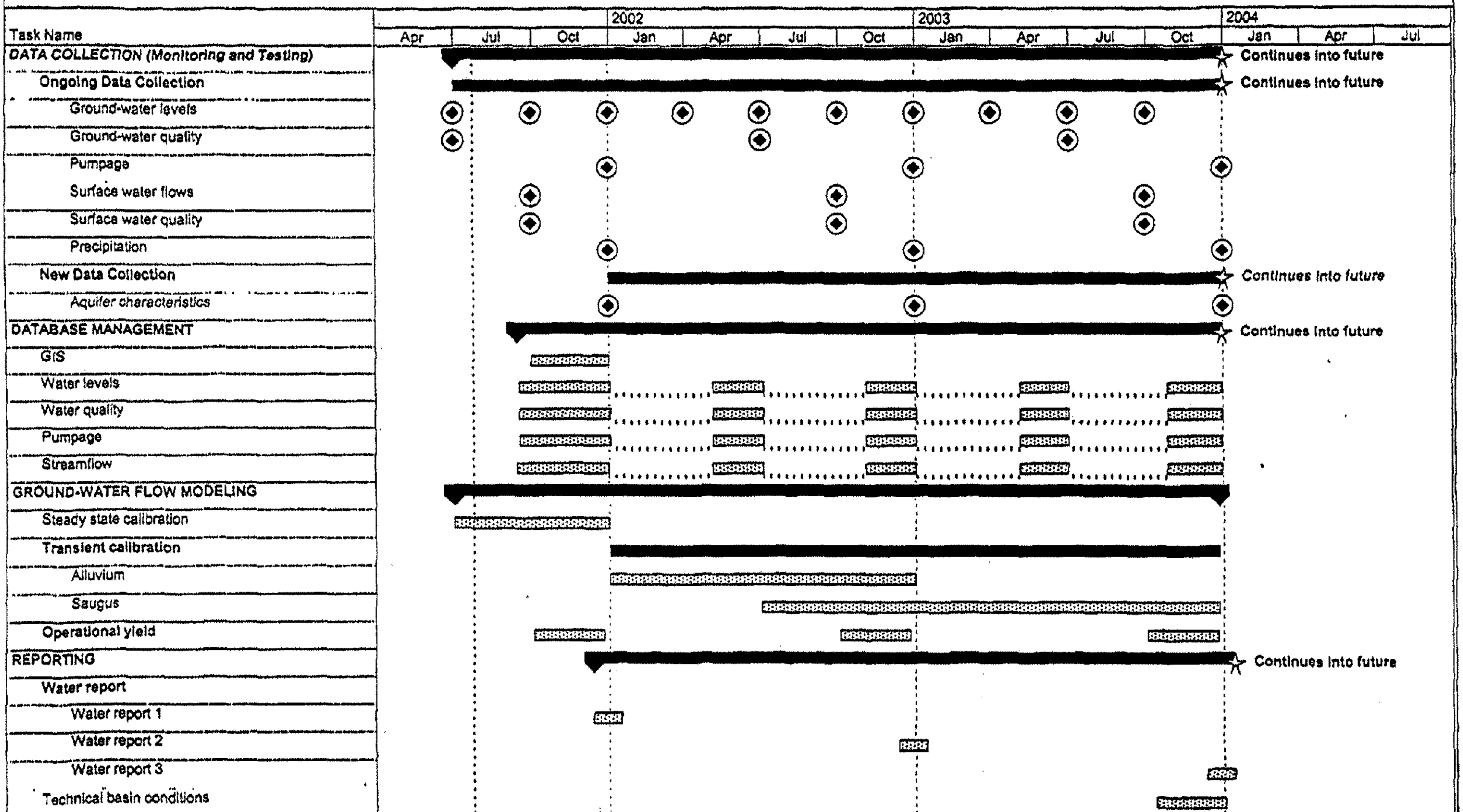
While current planning places future pumping of the Alluvium in the same range as has historically occurred for several decades, with anticipated similar results in terms of Alluvial water levels, storage, and quality, the model described above will be a useful tool to quantify the impacts in water budget terms and to analyze a range of scenarios as appropriate to optimize the use of the high-yielding Alluvium. The Saugus Formation is alternately being considered for short-term dry-period water supply at capacities higher than have historically been pumped from that formation, and for injection, storage and recovery of water as part of the overall water supply of the Upper Santa Clara River area. The model will also be used to determine the operational yield of the Saugus under a wide-ranging set of low to high pumping capacities (during wet to dry years, respectively), and with varying aquifer storage (recharge), to avoid undesirable impacts and assure that the operating yield is not exceeded over a multi-year wet/dry cycle.

REPORTING

Beginning in 1998, an annual report on water supply conditions in the Upper Santa Clara River area has been prepared by the water purveyors in the Upper River area. Those reports have focused on a planning-level discussion of current and immediate future water demands, and the availability of local Groundwater and imported surface water to meet those demands. The overall primary objectives of the reports have been to provide some documentation, to local and County planners as well as County Supervisors, on the water supply conditions in the Santa Clarita Valley and to present a general assessment of the status of groundwater conditions in both the Alluvial and Saugus aquifer systems, with a focus of that assessment on historical and recent groundwater development within operating yield parameters.

As the water resource monitoring program described above is implemented and evolves, it is planned that reporting on groundwater basin conditions will evolve in two generally parallel ways: 1) a continuation of the annual reporting on current water supply conditions, as a basis for current planning and consideration of development proposals; and 2) the addition of less frequent, more technically oriented reports on the geologic and hydrologic aspects of the groundwater resources of the Upper River area, including documentation of: a) groundwater basin conditions, b) development and application of modeling efforts to assess operational yield and the impacts of long-term planned utilization of local groundwater as part of the overall water supply, and c) assessment of actual versus predicted impacts on groundwater and surface water, including basin outflows, combined with ongoing updated assessments of the adequacy of local groundwater management actions and identification of any needed changes which are identified over time. As needed, the resource monitoring program and technical reports will be coordinated with interested regulatory agencies such as the Regional Water Quality Control Board, the California Department of Health Services and the California Department of Toxics and Substance Control.

Exhibit 2
WATER RESOURCE MONITORING PROGRAM
UPPER SANTA CLARA RIVER AREA



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APPENDIX B

Analyses of Specific Capacity Test Data for the Alluvial Aquifer

Specific capacity data are available for production wells in the Alluvial Aquifer through 2000. Tables B-1 through B-6 present these data and the calculations of estimated transmissivity (T) and horizontal hydraulic conductivity (Kh) values, along with how these values compare with the values used in the calibrated groundwater flow model at each well location. Rows in bold font identify specific capacity tests that were considered to provide the best indications of aquifer properties.

The tables show the testing data for different geographic areas in the Alluvial Aquifer[1], as well as the estimated drawdown in the aquifer formation for different values of well efficiency. Because of the unconfined nature of the Alluvial Aquifer system, the following equations were used to calculate T and Kh (Driscoll, 1986):

$$s = s_{well} * E$$

$$T = 1500 * Q / s \qquad (1)$$

$$Kh = T / (7.48 * b_{typical})$$

where:

s = the estimated drawdown in the aquifer formation

s_{well} = the measured drawdown in the well during the efficiency test

E = the well estimated efficiency

T = the transmissivity (gallons per day per foot [gpd/ft])

Q = the pumping rate (gallons per minute [gpm])

Q/s = specific capacity of the well

Kh = the horizontal hydraulic conductivity of the alluvial aquifer (feet per day [ft/day])

$b_{typical}$ = the typical long-term average saturated thickness (feet [ft]) of the alluvial aquifer at the location of the specific well

For each test, Tables B-1 through B-6 show the data and the calculations for drawdown, T, and Kh at different estimated well efficiencies (70 percent is the typical efficiency of a well that is in good condition; 50 percent reflects a well that is less efficient).[2] As shown in the table, the T and Kh values vary widely with location, as well as over time at individual wells. The table uses bold font to identify those tests that are believed to be the least affected

[1] See Figure 2-3 for well locations. See also Figure 4-1 for the locations of the target wells and zones that were used during calibration of the Alluvial Aquifer in the Santa Clarita Valley Groundwater Model (Regional Model).

[2] Well efficiency is a function of the design, construction, and condition of the well.

by well efficiency issues (i.e., show the highest specific capacity values) and therefore provide the best estimate of aquifer parameter values at each well location. Specific conclusions from this analysis are:

a. In the western alluvium along the main Santa Clara River valley (west of I-5), it appears that few wells have high enough efficiencies to provide estimates of Alluvial Aquifer Kh values. The highest specific capacities for the Alluvial Aquifer are indicated by only about 19 of the 335 tests performed in this area. For these 19 tests and a well efficiency of 70 percent, the Kh ranges from approximately 300 to 1,000 ft/day and is typically approximately 500 to 600 ft/day. The Regional Model uses a Kh of 550 ft/day throughout this area.

b. In the central valley, between I-5 and Soledad Canyon, 8 of the 11 tested wells appear to provide usable estimates of Alluvial Aquifer Kh values. These wells indicate a Kh range typically between 250 and 600 feet/day, though one well (NLF-R2) indicates Kh values potentially as high as 800 ft/day or greater. The Regional Model uses values between 245 and 375 ft/day in most of this area, and 550 ft/day at the very eastern edge of this area, at the mouth of Soledad Canyon.

c. In the lower reach of Soledad Canyon, most wells indicate Kh values ranging from 600 ft/day to more than 1,000 ft/day. Only the SCWC-Honby well suggests lower Kh values of approximately 300 to 550 ft/day. The Regional Model uses a Kh of 550 ft/day throughout this area.

d. In the upper reach of Soledad Canyon, the Kh values show more variability from well to well than lower Soledad Canyon. Kh values in upper Soledad Canyon range from approximately 300 to 700 ft/day at some wells, and 900 to 1,500 ft/day at the other wells. The Regional Model uses Kh values ranging from 350 ft/day at the eastern end of the canyon to 550 ft/day farther west.

e. In the tributary canyons north of the Santa Clara River, Alluvial Aquifer Kh values tend to be slightly lower than along the Santa Clara River main valley.

    1. Along Castaic Creek, Kh values are commonly between 350 and 600 ft/day, though a few tests suggest values as high as 800 to 1,000 ft/day. The Regional Model uses a value of 315 ft/day below Castaic Dam and at the NCWD Castaic wellfield, and 350 ft/day between this wellfield and the alluvial valley containing the Santa Clara River.

    2. In San Francisquito Canyon, the W series wells owned by VWC and NLF suggest Kh values of approximately 200 to 400 ft/day. The Regional Model uses a value of 105 ft/day.

    3. In Bouquet Canyon, the two SCWC wells suggest Kh values of approximately 500 to 900 ft/day. The Regional Model uses a value of 140 ft/day at SCWC-Guida in the central portion of the canyon, and 245 ft/day at SCWC-Clark well in the lower reaches of the canyon.

The estimation of K values from specific capacity test data is a method that provides only an approximation of aquifer properties. This method is valuable for constraining the Regional Model's calibration because specific capacity tests provide the only source of data that allow estimation and comparison of Alluvial Aquifer properties across the valley. Nonetheless, the method is affected by the following factors and uncertainties:

a. The measured drawdown in a well is affected by the radius of the well and the borehole, and the efficiency of the well at the time it is tested.

b. Yield and drawdown are affected by the length of the well screen and the fraction of the aquifer's thickness that is screened.

c. Fluctuations in water levels that occur seasonally and over multi-year periods affect the yield and drawdown of the well, and also the estimates of saturated thickness that are necessary for performing the calculations.

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Tables

TABLE B-1
Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Western Santa Clarita Valley
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
NLF	B5	**04/24/1984**	**1988**	**6.9**	**288.1**	**6.9**	**4.83**	**3.45**	**82,534**	**115,548**	**60,500**	**110**	**750**	**1,050**	**550**
		06/09/1986	1816	5.6	324.3	5.6	3.92	2.8	92,905	130,067		110	845	1,182	
		10/15/1987	1878	6.6	284.5	6.6	4.62	3.3	81,503	114,104		110	741	1,037	
		10/04/1988	1342	6.7	200.3	6.7	4.69	3.35	57,382	80,334		110	522	730	
		07/20/1989	1659	8.6	192.9	8.6	6.02	4.3	55,262	77,366		110	502	703	
		06/13/1990	1699	8	212.4	8	5.6	4	60,848	85,187		110	553	774	
		05/28/1991	**2013**	**7.6**	**264.9**	**7.6**	**5.32**	**3.8**	**75,888**	**106,243**	**60,500**	**110**	**690**	**966**	**550**
		07/26/1993	1895	7.2	263.2	7.2	5.04	3.6	75,401	105,561		110	685	960	
		08/15/1994	1870	6.3	296.8	6.3	4.41	3.15	85,027	119,037		110	773	1,082	
		07/18/1995	2081	6.5	320.2	6.5	4.55	3.25	91,730	128,422		110	834	1,167	
		06/10/1996	**2045**	**6.5**	**314.6**	**6.5**	**4.55**	**3.25**	**90,126**	**126,176**	**60,500**	**110**	**819**	**1,147**	**550**
		05/08/1997	1898	6.6	287.6	6.6	4.62	3.3	82,391	115,348		110	749	1,049	
		03/28/2000	**2357**	**6**	**392.8**	**6**	**4.2**	**3**	**112,529**	**157,540**	**60,500**	**110**	**1,023**	**1,432**	**550**
NLF	B6	05/21/1984	1473	12.1	121.7	12.1	8.47	6.05	34,864	48,810		110	317	444	
		06/09/1986	1886	15	125.7	15	10.5	7.5	36,010	50,414		110	327	458	
		10/15/1987	1190	10.4	114.4	10.4	7.28	5.2	32,773	45,882		110	298	417	
		07/20/1989	1043	8.4	124.2	8.4	5.88	4.2	35,581	49,813		110	323	453	
		06/13/1990	1083	10.4	104.1	10.4	7.28	5.2	29,822	41,751		110	271	380	
		05/30/1991	1603	11.9	134.7	11.9	8.33	5.95	38,589	54,024		110	351	491	
		06/10/1992	**1746**	**11.6**	**150.5**	**11.6**	**8.12**	**5.8**	**43,115**	**60,361**	**60,500**	**110**	**392**	**549**	**550**
		07/26/1993	1473	6.7	219.9	6.7	4.69	3.35	62,997	88,195		110	573	802	
		08/15/1994	1460	15.5	94.2	15.5	10.85	7.75	26,986	37,781		110	245	343	
		07/19/1995	**1600**	**9.2**	**173.9**	**9.2**	**6.44**	**4.6**	**49,819**	**69,746**	**60,500**	**110**	**453**	**634**	**550**
		06/10/1996	1274	18.6	68.5	18.6	13.02	9.3	19,624	27,473		110	178	250	
		05/08/1997	1394	15.6	89.4	15.6	10.92	7.8	25,611	35,856		110	233	326	
		06/26/1998	1554	15	103.6	15	10.5	7.5	29,679	41,551		110	270	378	
		05/06/1999	1504	13.3	113.1	13.3	9.31	6.65	32,401	45,361		110	295	412	
		05/21/1999	1504	13.3	113.1	13.3	9.31	6.65	32,401	45,361		110	295	412	
		04/21/2000	1086	22.4	48.5	22.4	15.68	11.2	13,894	19,452		110	126	177	
NLF	B7	02/24/1984	832	34.2	24.3	34.2	23.94	17.1	6,961	9,746	60,500	110	63	89	550
		04/24/1984	832	34.2	24.3	34.2	23.94	17.1	6,961	9,746		110	63	89	
		06/03/1986	766	33.4	22.9	33.4	23.38	16.7	6,560	9,184		110	60	83	
		12/21/1989	700	52.9	13.2	52.9	37.03	26.45	3,782	5,294		110	34	48	
		06/12/1990	766	50.5	15.2	50.5	35.35	25.25	4,354	6,096		110	40	55	
		05/29/1991	878	37.1	23.7	37.1	25.97	18.55	6,790	9,505		110	62	86	
		06/10/1992	837	14.9	56.2	14.9	10.43	7.45	16,100	22,540		110	146	205	
		07/23/1993	911	16.9	53.9	16.9	11.83	8.45	15,441	21,618		110	140	197	
		08/30/1994	730	33.5	21.8	33.5	23.45	16.75	6,245	8,743		110	57	79	
		07/17/1995	720	25.9	27.8	25.9	18.13	12.95	7,964	11,150		110	72	101	
		06/11/1996	725	29.5	24.6	29.5	20.65	14.75	7,047	9,866		110	64	90	
		06/26/1998	689	27.1	25.4	27.1	18.97	13.55	7,277	10,187		110	66	93	
		05/10/1999	915	27	33.9	27	18.9	13.5	9,712	13,596		110	88	124	
		05/21/1999	915	27	33.9	27	18.9	13.5	9,712	13,596		110	88	124	
		04/21/2000	945	49.6	19.1	49.6	34.72	24.8	5,472	7,660		110	50	70	
NLF	B10	07/13/1982	1325	33.2	39.9	33.2	23.24	16.6	11,430	16,003	60,500	110	104	145	550
		05/29/1991	1556	38.7	40.2	38.7	27.09	19.35	11,516	16,123		110	105	147	
		07/26/1993	1637	41	39.9	41	28.7	20.5	11,430	16,003		110	104	145	
		08/10/1994	1328	31.9	41.6	31.9	22.33	15.95	11,917	16,684		110	108	152	
		07/18/1995	1409	37.2	37.9	37.2	26.04	18.6	10,858	15,201		110	99	138	
		06/10/1996	1339	40	33.5	40	28	20	9,597	13,436		110	87	122	
		05/08/1997	1316	45.7	28.8	45.7	31.99	22.85	8,251	11,551		110	75	105	
		06/04/1998	1263	36.5	34.6	36.5	25.55	18.25	9,912	13,877		110	90	126	

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Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
		05/06/1999	1259	43.4	29	43.4	30.38	21.7	8,308	11,631		110	76	106	
		05/21/1999	1259	43.4	29	43.4	30.38	21.7	8,308	11,631		110	76	106	
		04/21/2000	1259	39.4	32	39.4	27.58	19.7	9,167	12,834		110	83	117	
NLF	B11	07/27/1993	219	14.9	14.7	14.9	10.43	7.45	4,211	5,896	60,500	110	38	54	550
		08/17/1994	226	15.5	14.6	15.5	10.85	7.75	4,183	5,856		110	38	53	
		07/17/1995	429	12.4	34.6	12.4	8.68	6.2	9,912	13,877		110	90	126	
		05/14/1997	950	28	33.9	28	19.6	14	9,712	13,596		110	88	124	
		06/26/1998	817	22.9	35.7	22.9	16.03	11.45	10,227	14,318		110	93	130	
		05/10/1999	714	19.5	36.6	19.5	13.65	9.75	10,485	14,679		110	95	133	
		05/21/1999	714	19.5	36.6	19.5	13.65	9.75	10,485	14,679		110	95	133	
		04/21/2000	860	26.2	32.8	26.2	18.34	13.1	9,396	13,155		110	85	120	
NLF	C	04/09/1984	1351	49.4	27.3	49.4	34.58	24.7	7,821	10,949	60,500	110	71	100	550
		05/21/1986	1325	54.2	24.4	54.2	37.94	27.1	6,990	9,786		110	64	89	
		10/19/1987	1342	46	29.2	46	32.2	23	8,365	11,711		110	76	106	
		10/04/1988	1336	45	29.7	45	31.5	22.5	8,508	11,912		110	77	108	
		07/10/1989	1360	35.2	38.6	35.2	24.64	17.6	11,058	15,481		110	101	141	
		06/11/1990	1331	36.6	36.4	36.6	25.62	18.3	10,428	14,599		110	95	133	
		05/06/1991	1342	48.3	27.8	48.3	33.81	24.15	7,964	11,150		110	72	101	
		06/08/1992	1257	48	26.2	48	33.6	24	7,506	10,508		110	68	96	
		07/30/1993	1178	26.6	44.3	26.6	18.62	13.3	12,691	17,767		110	115	162	
		08/02/1994	1318	24.6	53.6	24.6	17.22	12.3	15,355	21,497		110	140	195	
		06/28/1995	1290	29	44.5	29	20.3	14.5	12,748	17,848		110	116	162	
		05/30/1996	1238	35.6	34.8	35.6	24.92	17.8	9,969	13,957		110	91	127	
		04/24/1997	1247	34	36.7	34	23.8	17	10,514	14,719		110	96	134	
		05/27/1998	1282	36.3	35.3	36.3	25.41	18.15	10,113	14,158		110	92	129	
		04/27/1999	1152	37.6	30.6	37.6	26.32	18.8	8,766	12,273		110	80	112	
		05/21/1999	1152	37.6	30.6	37.6	26.32	18.8	8,766	12,273		110	80	112	
		04/21/2000	1195	34	35.1	34	23.8	17	10,055	14,078		110	91	128	
NLF	C3	04/17/1984	935	42.4	22.1	42.4	29.68	21.2	6,331	8,864	60,500	110	58	81	550
		05/14/1986	870	54.7	15.9	54.7	38.29	27.35	4,555	6,377		110	41	58	
		07/12/1989	908	37.3	24.3	37.3	26.11	18.65	6,961	9,746		110	63	89	
		06/11/1990	549	25.1	21.9	25.1	17.57	12.55	6,274	8,783		110	57	80	
		05/07/1991	573	24.3	23.6	24.3	17.01	12.15	6,761	9,465		110	61	86	
		06/09/1992	814	45.5	17.9	45.5	31.85	22.75	5,128	7,179		110	47	65	
		07/31/1993	633	31.4	20.2	31.4	21.98	15.7	5,787	8,102		110	53	74	
		08/05/1994	739	19.2	38.5	19.2	13.44	9.6	11,029	15,441		110	100	140	
		07/11/1995	638	23.3	27.4	23.3	16.31	11.65	7,850	10,989		110	71	100	
		06/04/1996	553	30.9	17.9	30.9	21.63	15.45	5,128	7,179		110	47	65	
		05/07/1997	894	62.4	14.3	62.4	43.68	31.2	4,097	5,735		110	37	52	
		06/03/1998	754	64.1	11.8	64.1	44.87	32.05	3,380	4,733		110	31	43	
		05/03/1999	653	74.7	8.7	74.7	52.29	37.35	2,492	3,489		110	23	32	
		05/21/1999	653	74.7	8.7	74.7	52.29	37.35	2,492	3,489		110	23	32	
		04/21/2000	573	53.2	10.8	53.2	37.24	26.6	3,094	4,332		110	28	39	
NLF	C4	04/17/1984	1280	43.2	29.6	43.2	30.24	21.6	8,480	11,872		110	77	108	
		05/14/1986	1056	41	25.8	41	28.7	20.5	7,391	10,348		110	67	94	
		06/11/1990	1130	30	37.7	30	21	15	10,800	15,120		110	98	137	
		05/07/1991	1348	35.9	37.5	35.9	25.13	17.95	10,743	15,040		110	98	137	
		06/09/1992	1225	36.7	33.4	36.7	25.69	18.35	9,568	13,396		110	87	122	
		07/29/1993	834	21.3	39.2	21.3	14.91	10.65	11,230	15,722		110	102	143	
		08/05/1994	**1038**	**12.6**	**82.4**	**12.6**	**8.82**	**6.3**	**23,606**	**33,048**	**60,500**	**110**	**215**	**300**	**550**
		07/11/1995	1248	24.9	50.1	24.9	17.43	12.45	14,353	20,094		110	130	183	
		06/04/1996	1279	25.1	51	25.1	17.57	12.55	14,610	20,455		110	133	186	

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		05/07/1997	1310	27.8	47.1	27.8	19.46	13.9	13,493	18,890		110	123	172	
		06/03/1998	1279	29.4	43.5	29.4	20.58	14.7	12,462	17,447		110	113	159	
		05/03/1999	1072	32	33.5	32	22.4	16	9,597	13,436		110	87	122	
		05/21/1999	1072	32	33.5	32	22.4	16	9,597	13,436		110	87	122	
		04/21/2000	1156	30	38.5	30	21	15	11,029	15,441		110	100	140	
NLF	C5	04/09/1984	674	56.9	11.8	56.9	39.83	28.45	3,380	4,733	60,500	110	31	43	550
		05/15/1986	592	88.2	6.7	88.2	61.74	44.1	1,919	2,687		110	17	24	
		10/19/1987	587	84.3	7	84.3	59.01	42.15	2,005	2,807		110	18	26	
		07/18/1989	697	49.9	14	49.9	34.93	24.95	4,011	5,615		110	36	51	
		06/12/1990	638	68.3	9.3	68.3	47.81	34.15	2,664	3,730		110	24	34	
		05/08/1991	715	63.5	11.3	63.5	44.45	31.75	3,237	4,532		110	29	41	
		06/09/1992	722	63.9	11.3	63.9	44.73	31.95	3,237	4,532		110	29	41	
		07/30/1993	715	41.9	17.1	41.9	29.33	20.95	4,899	6,858		110	45	62	
		08/08/1994	796	13.6	58.5	13.6	9.52	6.8	16,759	23,463		110	152	213	
		07/07/1995	802	14.9	53.8	14.9	10.43	7.45	15,413	21,578		110	140	196	
		05/30/1996	945	21.6	43.8	21.6	15.12	10.8	12,548	17,567		110	114	160	
		05/06/1997	880	18.2	48.4	18.2	12.74	9.1	13,866	19,412		110	126	176	
		06/01/1998	885	21.5	41.2	21.5	15.05	10.75	11,803	16,524		110	107	150	
		04/27/1999	895	21.2	42.2	21.2	14.84	10.6	12,089	16,925		110	110	154	
		05/21/1999	895	21.2	42.2	21.2	14.84	10.6	12,089	16,925		110	110	154	
		04/21/2000	804	17.2	46.7	17.2	12.04	8.6	13,379	18,730		110	122	170	
NLF	C6	04/09/1984	153	29.9	5.1	29.9	20.93	14.95	1,461	2,045	60,500	110	13	19	550
		05/15/1986	137	34.2	4	34.2	23.94	17.1	1,146	1,604		110	10	15	
		10/19/1987	147	33.7	4.4	33.7	23.59	16.85	1,261	1,765		110	11	16	
		07/12/1989	124	31.4	3.9	31.4	21.98	15.7	1,117	1,564		110	10	14	
		06/06/1990	141	36.4	3.9	36.4	25.48	18.2	1,117	1,564		110	10	14	
		05/08/1991	133	41	3.2	41	28.7	20.5	917	1,283		110	8	12	
		12/21/1994	445	33.8	13.2	33.8	23.66	16.9	3,782	5,294		110	34	48	
		07/07/1995	459	33.2	13.8	33.2	23.24	16.6	3,953	5,535		110	36	50	
		05/28/1996	405	39.7	10.2	39.7	27.79	19.85	2,922	4,091		110	27	37	
		04/24/1997	364	44.6	8.2	44.6	31.22	22.3	2,349	3,289		110	21	30	
		05/27/1998	349	49.2	7.1	49.2	34.44	24.6	2,034	2,848		110	18	26	
		04/27/1999	305	50	6.1	50	35	25	1,748	2,447		110	16	22	
		05/21/1999	305	50	6.1	50	35	25	1,748	2,447		110	16	22	
		04/21/2000	260	50.5	5.1	50.5	35.35	25.25	1,461	2,045		110	13	19	
NLF	C7	04/10/1984	1118	44.5	25.1	44.5	31.15	22.25	7,191	10,067	60,500	110	65	92	550
		05/15/1986	1050	42.4	24.8	42.4	29.68	21.2	7,105	9,947		110	65	90	
		10/14/1987	1104	38.5	28.7	38.5	26.95	19.25	8,222	11,511		110	75	105	
		07/10/1989	434	38.3	11.3	38.3	26.81	19.15	3,237	4,532		110	29	41	
		06/11/1990	1067	32.8	32.5	32.8	22.96	16.4	9,311	13,035		110	85	118	
		05/28/1991	1082	37.6	28.8	37.6	26.32	18.8	8,251	11,551		110	75	105	
		06/08/1992	1047	47.1	22.2	47.1	32.97	23.55	6,360	8,904		110	58	81	
		07/31/1993	1054	37.9	27.8	37.9	26.53	18.95	7,964	11,150		110	72	101	
		08/01/1994	1008	39.5	25.5	39.5	27.65	19.75	7,305	10,227		110	66	93	
		06/28/1995	1082	38.1	28.4	38.1	26.67	19.05	8,136	11,390		110	74	104	
		06/03/1996	1032	43.7	23.6	43.7	30.59	21.85	6,761	9,465		110	61	86	
		05/06/1997	995	44.4	22.4	44.4	31.08	22.2	6,417	8,984		110	58	82	
		06/03/1998	919	50.9	18.1	50.9	35.63	25.45	5,185	7,259		110	47	66	
		05/03/1999	944	44.6	21.2	44.6	31.22	22.3	6,073	8,503		110	55	77	
		05/21/1999	944	44.6	21.2	44.6	31.22	22.3	6,073	8,503		110	55	77	
		04/21/2000	914	42.5	21.5	42.5	29.75	21.25	6,159	8,623		110	56	78	

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NLF	C8	10/19/1950	318	76.3	4.2	76.3	53.41	38.15	1,203	1,684	60,500	110	11	15	550
		09/26/1951	365	52.5	7	52.5	36.75	26.25	2,005	2,807		110	18	26	
		10/01/1952	434	39.4	11	39.4	27.58	19.7	3,151	4,412		110	29	40	
		02/08/1955	548	56.4	9.7	56.4	39.48	28.2	2,779	3,890		110	25	35	
		10/04/1956	351	76.4	4.6	76.4	53.48	38.2	1,318	1,845		110	12	17	
		07/05/1957	260	92	2.8	92	64.4	46	802	1,123		110	7	10	
		09/12/1957	522	77	6.8	77	53.9	38.5	1,948	2,727		110	18	25	
		07/30/1958	394	49	8	49	34.3	24.5	2,292	3,209		110	21	29	
		10/31/1958	493	69.3	7.1	69.3	48.51	34.65	2,034	2,848		110	18	26	
		08/05/1959	443	76	5.8	76	53.2	38	1,662	2,326		110	15	21	
		07/06/1960	443	78.4	5.7	78.4	54.88	39.2	1,633	2,286		110	15	21	
		07/20/1961	329	72.3	4.6	72.3	50.61	36.15	1,318	1,845		110	12	17	
		05/31/1962	318	97.2	3.3	97.2	68.04	48.6	945	1,324		110	9	12	
		05/09/1963	271	104.6	2.6	104.6	73.22	52.3	745	1,043		110	7	9	
		07/14/1964	365	87.2	4.2	87.2	61.04	43.6	1,203	1,684		110	11	15	
		08/04/1965	362	88.9	4.1	88.9	62.23	44.45	1,175	1,644		110	11	15	
		11/01/1966	410	85	4.8	85	59.5	42.5	1,375	1,925		110	13	18	
		08/09/1967	377	104	3.6	104	72.8	52	1,031	1,444		110	9	13	
		08/28/1968	332	96.6	3.4	96.6	67.62	48.3	974	1,364		110	9	12	
		08/19/1969	410	75.4	5.4	75.4	52.78	37.7	1,547	2,166		110	14	20	
		07/09/1970	351	71.5	4.9	71.5	50.05	35.75	1,404	1,965		110	13	18	
		08/04/1971	572	76.4	7.5	76.4	53.48	38.2	2,149	3,008		110	20	27	
		01/12/1972	373	122.8	3	122.8	85.96	61.4	859	1,203		110	8	11	
		05/18/1972	414	110.9	3.7	110.9	77.63	55.45	1,060	1,484		110	10	13	
		07/17/1973	439	90.8	4.8	90.8	63.56	45.4	1,375	1,925		110	13	18	
		07/01/1974	419	108.8	3.9	108.8	76.16	54.4	1,117	1,564		110	10	14	
		05/03/1976	363	99.8	3.6	99.8	69.86	49.9	1,031	1,444		110	9	13	
		05/21/1984	546	59	9.3	59	41.3	29.5	2,664	3,730		110	24	34	
		07/10/1989	477	52.7	9.1	52.7	36.89	26.35	2,607	3,650		110	24	33	
		06/12/1990	488	52.2	9.3	52.2	36.54	26.1	2,664	3,730		110	24	34	
		05/06/1991	525	49.4	10.6	49.4	34.58	24.7	3,037	4,251		110	28	39	
		06/08/1992	477	48.6	9.8	48.6	34.02	24.3	2,807	3,930		110	26	36	
		07/30/1993	488	51.6	9.5	51.6	36.12	25.8	2,722	3,810		110	25	35	
		08/02/1994	520	30.4	17.1	30.4	21.28	15.2	4,899	6,858		110	45	62	
		07/11/1995	503	24.6	20.4	24.6	17.22	12.3	5,844	8,182		110	53	74	
		06/03/1996	535	29.3	18.3	29.3	20.51	14.65	5,243	7,340		110	48	67	
		05/06/1997	476	36.9	12.9	36.9	25.83	18.45	3,696	5,174		110	34	47	
		06/01/1998	478	34.5	13.9	34.5	24.15	17.25	3,982	5,575		110	36	51	
		05/03/1999	475	32.7	14.5	32.7	22.89	16.35	4,154	5,816		110	38	53	
		05/21/1999	475	32.7	14.5	32.7	22.89	16.35	4,154	5,816		110	38	53	
		04/21/2000	455	30.8	14.8	30.8	21.56	15.4	4,240	5,936		110	39	54	
NLF	E4	05/24/1984	1473	39.5	37.3	39.5	27.65	19.75	10,686	14,960	71,500	130	82	115	550
		06/02/1986	1511	41	36.9	41	28.7	20.5	10,571	14,799		130	81	114	
		10/03/1988	1897	42.9	44.2	42.9	30.03	21.45	12,662	17,727		130	97	136	
		07/18/1989	1576	35.5	44.4	35.5	24.85	17.75	12,720	17,807		130	98	137	
		06/04/1991	1225	17.5	70	17.5	12.25	8.75	20,053	28,075		130	154	216	
		07/23/1993	1944	38.2	50.9	38.2	26.74	19.1	14,582	20,414		130	112	157	
		05/22/1997	1956	37.2	52.6	37.2	26.04	18.6	15,069	21,096		130	116	162	
		05/11/1999	1868	39.7	47.1	39.7	27.79	19.85	13,493	18,890		130	104	145	
		05/21/1999	1868	39.7	47.1	39.7	27.79	19.85	13,493	18,890		130	104	145	
		04/21/2000	1691	30.5	55.4	30.5	21.35	15.25	15,871	22,219		130	122	171	

TABLE B-1

Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Western Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
NLF	E5	06/10/1992	1320	84	15.7	84	58.8	42	4,498	6,297		130	35	48	
		08/11/1993	1274	63.3	20.1	63.3	44.31	31.65	5,758	8,061		130	44	62	
		12/21/1994	1203	24.9	48.3	24.9	17.43	12.45	13,837	19,372		130	106	149	
		07/25/1995	1191	23.8	50	23.8	16.66	11.9	14,324	20,053		130	110	154	
		05/28/1996	824	13.6	60.6	13.6	9.52	6.8	17,361	24,305		130	134	187	
		05/12/1997	1179	15.1	78.1	15.1	10.57	7.55	22,374	31,324		130	172	241	
		06/04/1998	1022	22.7	45	22.7	15.89	11.35	12,892	18,048		130	99	139	
		06/05/1998	1022	22.7	45	22.7	15.89	11.35	12,892	18,048		130	99	139	
		08/18/2000	**705**	**5.1**	**138.2**	**5.1**	**3.57**	**2.55**	**39,591**	**55,428**	**71,500**	**130**	**305**	**426**	**550**
NLF	E7	08/11/1993	263	2.5	105.2	2.5	1.75	1.25	30,138	42,193	71,500	130	232	325	550
		08/08/1994	328	2.5	131.2	2.5	1.75	1.25	37,586	52,620		130	289	405	
		07/03/1995	325	2.4	135.4	2.4	1.68	1.2	38,789	54,305		130	298	418	
		06/05/1996	334	2.7	123.7	2.7	1.89	1.35	35,437	49,612		130	273	382	
		05/12/1997	320	2.6	123.1	2.6	1.82	1.3	35,265	49,372		130	271	380	
		05/16/1997	320	2.6	123.1	2.6	1.82	1.3	35,265	49,372		130	271	380	
NLF	E9	04/11/1984	601	75.6	7.9	75.6	52.92	37.8	2,263	3,168	63,250	130	17	24	550
		05/20/1986	578	76.2	7.6	76.2	53.34	38.1	2,177	3,048		130	17	23	
		12/11/1986	1190	57.1	20.8	57.1	39.97	28.55	5,959	8,342		130	46	64	
		10/13/1987	1069	59.9	17.8	59.9	41.93	29.95	5,099	7,139		130	39	55	
		09/28/1988	894	61.2	14.6	61.2	42.84	30.6	4,183	5,856		130	32	45	
		07/11/1989	897	60	15	60	42	30	4,297	6,016		130	33	46	
		05/29/1990	876	60.3	14.5	60.3	42.21	30.15	4,154	5,816		130	32	45	
		04/18/1991	970	60.3	16.1	60.3	42.21	30.15	4,612	6,457		130	35	50	
		06/04/1992	897	62.4	14.4	62.4	43.68	31.2	4,125	5,775		130	32	44	
		07/22/1993	1021	55.6	18.4	55.6	38.92	27.8	5,271	7,380		130	41	57	
		07/19/1994	1053	52.1	20.2	52.1	36.47	26.05	5,787	8,102		130	45	62	
		07/03/1995	1058	51.5	20.5	51.5	36.05	25.75	5,873	8,222		130	45	63	
		05/23/1996	1073	49.7	21.6	49.7	34.79	24.85	6,188	8,663		130	48	67	
		04/23/1997	1050	50.1	21	50.1	35.07	25.05	6,016	8,422		130	46	65	
		06/03/1998	1021	50.8	20.1	50.8	35.56	25.4	5,758	8,061		130	44	62	
		05/04/1999	1107	39.8	27.8	39.8	27.86	19.9	7,964	11,150		130	61	86	
		04/21/2000	1117	29.6	37.7	29.6	20.72	14.8	10,800	15,120		130	83	116	
NLF	G45	04/16/1984	1590	31.2	51	31.2	21.84	15.6	14,610	20,455	63,250	115	127	178	550
		05/27/1986	1008	20.5	49.2	20.5	14.35	10.25	14,095	19,733		115	123	172	
		07/13/1989	1379	33.7	40.9	33.7	23.59	16.85	11,717	16,404		115	102	143	
		06/14/1990	1399	32.3	43.3	32.3	22.61	16.15	12,405	17,366		115	108	151	
		05/30/1991	1456	37.8	38.5	37.8	26.46	18.9	11,029	15,441		115	96	134	
		06/10/1992	1434	36.7	39.1	36.7	25.69	18.35	11,201	15,682		115	97	136	
		07/29/1993	1172	24.9	47.1	24.9	17.43	12.45	13,493	18,890		115	117	164	
		08/08/1994	1325	29.7	44.6	29.7	20.79	14.85	12,777	17,888		115	111	156	
		07/19/1995	1140	25.6	44.5	25.6	17.92	12.8	12,748	17,848		115	111	155	
		05/23/1996	1130	25.3	44.7	25.3	17.71	12.65	12,806	17,928		115	111	156	
		05/07/1997	1162	25.9	44.9	25.9	18.13	12.95	12,863	18,008		115	112	157	
		06/04/1998	1396	41.4	33.7	41.4	28.98	20.7	9,654	13,516		115	84	118	
		05/10/1999	1030	23	44.8	23	16.1	11.5	12,834	17,968		115	112	156	
		05/21/1999	1030	23	44.8	23	16.1	11.5	12,834	17,968		115	112	156	
		04/21/2000	1257	26.9	46.7	26.9	18.83	13.45	13,379	18,730		115	116	163	
NLF	X3	04/11/1984	802	41	19.6	41	28.7	20.5	5,615	7,861	63,250	115	49	68	550
		05/20/1986	505	53.4	9.5	53.4	37.38	26.7	2,722	3,810		115	24	33	
		10/13/1987	740	40.6	18.2	40.6	28.42	20.3	5,214	7,299		115	45	63	
		09/28/1988	477	45.5	10.5	45.5	31.85	22.75	3,008	4,211		115	26	37	
		07/11/1989	572	61.4	9.3	61.4	42.98	30.7	2,664	3,730		115	23	32	

TABLE B-1

Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Western Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
		05/29/1990	444	47.5	9.3	47.5	33.25	23.75	2,664	3,730		115	23	32	
		04/18/1991	475	48.6	9.8	48.6	34.02	24.3	2,807	3,930		115	24	34	
		06/04/1992	587	46.1	12.7	46.1	32.27	23.05	3,638	5,094		115	32	44	
		07/22/1993	496	54	9.2	54	37.8	27	2,636	3,690		115	23	32	
		07/18/1994	465	52.2	8.9	52.2	36.54	26.1	2,550	3,570		115	22	31	
		07/03/1995	490	49.4	9.9	49.4	34.58	24.7	2,836	3,971		115	25	35	
		05/14/1996	449	53.9	8.3	53.9	37.73	26.95	2,378	3,329		115	21	29	
		04/23/1997	485	53.8	9	53.8	37.66	26.9	2,578	3,610		115	22	31	
		05/06/1998	531	47.9	11.1	47.9	33.53	23.95	3,180	4,452		115	28	39	
		05/04/1999	493	43.2	11.4	43.2	30.24	21.6	3,266	4,572		115	28	40	
		05/21/1999	493	43.2	11.4	43.2	30.24	21.6	3,266	4,572		115	28	40	
		04/21/2000	513	43.2	11.9	43.2	30.24	21.6	3,409	4,773		115	30	42	

Notes:

E = well efficiency

Kh = horizontal hydraulic conductivity

T = transmissivity

Bold font indicates tests that are least affected by well efficiency issues and therefore provide the best estimate of aquifer parameter values at the given well location.

TABLE B-2

Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Central Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
VWC	I	05/23/1984	993	8.7	114.1	8.7	6.09	4.35	32,687	45,762	22,500	130	251	352	375
		06/09/1986	1058	9.6	110.2	9.6	6.72	4.8	31,570	44,198	22,500	130	243	340	375
		02/03/1992	140	73	1.9	73	51.1	36.5	544	762		130	4	6	
		07/06/1994	129	86.2	1.5	86.2	60.34	43.1	430	602		130	3	5	
		08/01/1994	129	86.2	1.5	86.2	60.34	43.1	430	602		130	3	5	
VWC	K2	01/29/1992	1563	7.1	220.1	7.1	4.97	3.55	63,054	88,275	54,375	145	435	609	375
		05/13/1994	1365	7.1	192.3	7.1	4.97	3.55	55,090	77,126		145	380	532	
		04/17/1996	1650	8.6	191.9	8.6	6.02	4.3	54,975	76,965		145	379	531	
		07/11/1997	1333	6.3	211.6	6.3	4.41	3.15	60,619	84,866	54,375	145	418	585	375
		12/30/1998	1409	6.7	210.3	6.7	4.69	3.35	60,246	84,345		145	415	582	
VWC	L2	04/26/1984	2197	28.3	77.6	28.3	19.81	14.15	22,231	31,123	54,375	145	153	215	375
		11/21/1991	1400	19	73.7	19	13.3	9.5	21,113	29,559		145	146	204	
		01/29/1992	1466	26.1	56.2	26.1	18.27	13.05	16,100	22,540		145	111	155	
		05/13/1994	1256	32.8	38.3	32.8	22.96	16.4	10,972	15,361		145	76	106	
		04/17/1996	1210	29.6	40.9	29.6	20.72	14.8	11,717	16,404		145	81	113	
		07/14/1997	851	17.6	48.4	17.6	12.32	8.8	13,866	19,412		145	96	134	
		12/11/1998	931	24.5	38	24.5	17.15	12.25	10,886	15,241		145	75	105	
VWC	N	08/05/1969	1891	31.6	59.8	31.6	22.12	15.8	17,131	23,984	54,375	145	118	165	375
		08/27/1970	1787	27	66.2	27	18.9	13.5	18,965	26,551		145	131	183	
		07/21/1977	1427	15.2	93.9	15.2	10.64	7.6	26,900	37,660		145	186	260	
		05/23/1978	1448	14.6	99.2	14.6	10.22	7.3	28,419	39,786		145	196	274	
		11/05/1979	1427	15.4	92.7	15.4	10.78	7.7	26,557	37,179		145	183	256	
		11/17/1980	1450	21.8	66.5	21.8	15.26	10.9	19,051	26,671		145	131	184	
		10/26/1981	1427	26	54.9	26	18.2	13	15,728	22,019		145	108	152	
		06/10/1982	1427	24.1	59.2	24.1	16.87	12.05	16,960	23,743		145	117	164	
		02/04/1985	1562	22.9	68.2	22.9	16.03	11.45	19,538	27,353		145	135	189	
		08/07/1986	1450	23	63	23	16.1	11.5	18,048	25,267		145	124	174	
		04/25/1988	1404	23.3	60.3	23.3	16.31	11.65	17,275	24,184		145	119	167	
		02/01/1990	1380	22.5	61.3	22.5	15.75	11.25	17,561	24,586		145	121	170	
		05/30/1990	1350	21	64.3	21	14.7	10.5	18,421	25,789		145	127	178	
		11/21/1991	1320	19.5	67.7	19.5	13.65	9.75	19,395	27,152		145	134	187	
		01/30/1992	1378	20.8	66.3	20.8	14.56	10.4	18,994	26,591		145	131	183	
		05/13/1994	1328	16.9	78.6	16.9	11.83	8.45	22,517	31,524		145	155	217	
		04/18/1996	1320	16.8	78.6	16.8	11.76	8.4	22,517	31,524		145	155	217	
		07/11/1997	927	10.2	90.9	10.2	7.14	5.1	26,041	36,457		145	180	251	
		12/01/1998	1086	11.5	94.4	11.5	8.05	5.75	27,044	37,861		145	187	261	
VWC	N3	11/21/1991	1550	8	193.8	8	5.6	4	55,519	77,727	79,750	145	383	536	550
		05/12/1994	1520	11.3	134.5	11.3	7.91	5.65	38,531	53,944		145	266	372	
		04/18/1996	1294	7	184.9	7	4.9	3.5	52,970	74,158		145	365	511	
		07/14/1997	1121	6.5	172.5	6.5	4.55	3.25	49,417	69,184		145	341	477	
		12/11/1998	1319	8.5	155.2	8.5	5.95	4.25	44,461	62,246		145	307	429	
VWC	N4	11/21/1991	1510	5.5	274.5	5.5	3.85	2.75	78,638	110,094	54,375	145	542	759	375
		01/28/1992	1474	6.5	226.8	6.5	4.55	3.25	64,973	90,963		145	448	627	
		05/12/1994	1303	6.3	206.8	6.3	4.41	3.15	59,244	82,941		145	409	572	
		04/17/1996	1384	5.3	261.1	5.3	3.71	2.65	74,799	104,719		145	516	722	
		07/14/1997	1171	5	234.2	5	3.5	2.5	67,093	93,930		145	463	648	
		12/11/1998	1249	4.6	271.5	4.6	3.22	2.3	77,779	108,890		145	536	751	

TABLE B-2
Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Central Santa Clarita Valley
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
VWC	Q2	02/17/1955	2343	24.2	96.8	24.2	16.94	12.1	27,731	38,824		145	191	268	
		03/09/1955	2310	23.5	98.3	23.5	16.45	11.75	28,161	39,425		145	194	272	
		10/21/1955	2103	21.5	97.8	21.5	15.05	10.75	28,018	39,225		145	193	271	
		08/01/1957	1589	28.9	55	28.9	20.23	14.45	15,756	22,059		145	109	152	
		11/18/1958	1696	26.3	64.5	26.3	18.41	13.15	18,478	25,869		145	127	178	
		07/26/1960	1073	17.9	59.9	17.9	12.53	8.95	17,160	24,024		145	118	166	
		06/27/1962	1349	34.6	39	34.6	24.22	17.3	11,173	15,642		145	77	108	
		06/19/1963	1920	25.5	75.3	25.5	17.85	12.75	21,572	30,201		145	149	208	
		09/21/1964	1611	24.3	66.3	24.3	17.01	12.15	18,994	26,591		145	131	183	
		09/17/1965	1414	17.7	79.9	17.7	12.39	8.85	22,890	32,045		145	158	221	
		07/26/1967	1806	16	112.9	16	11.2	8	32,343	45,281		145	223	312	
		10/05/1970	1711	15.6	109.7	15.6	10.92	7.8	31,427	43,997		145	217	303	
		08/16/1971	1880	17.2	109.3	17.2	12.04	8.6	31,312	43,837		145	216	302	
		07/03/1974	2022	25.9	78.1	25.9	18.13	12.95	22,374	31,324		145	154	216	
		10/21/1975	1552	37.9	40.9	37.9	26.53	18.95	11,717	16,404		145	81	113	
		08/03/1976	1688	19.7	85.7	19.7	13.79	9.85	24,551	34,372		145	169	237	
		06/14/1977	1688	19.7	85.7	19.7	13.79	9.85	24,551	34,372		145	169	237	
		05/24/1978	1626	20.5	79.3	20.5	14.35	10.25	22,718	31,805		145	157	219	
		12/03/1979	1542	29.4	52.4	29.4	20.58	14.7	15,011	21,016		145	104	145	
		11/13/1980	1752	33.2	52.8	33.2	23.24	16.6	15,126	21,176		145	104	146	
		06/09/1982	1898	43.5	43.6	43.5	30.45	21.75	12,490	17,487		145	86	121	
		02/25/1985	1960	54.8	35.8	54.8	38.36	27.4	10,256	14,358		145	71	99	
		06/07/1986	1804	72.4	24.9	72.4	50.68	36.2	7,133	9,987		145	49	69	
		04/28/1988	**2297**	**18.4**	**124.8**	**18.4**	**12.88**	**9.2**	**35,752**	**50,053**	**79,750**	**145**	**247**	**345**	**550**
		02/01/1990	1965	19.5	100.8	19.5	13.65	9.75	28,877	40,428		145	199	279	
		05/29/1990	1890	18	105	18	12.6	9	30,080	42,112		145	207	290	
		03/19/1992	1874	19	98.6	19	13.3	9.5	28,247	39,545		145	195	273	
		05/24/1994	1637	15.3	107	15.3	10.71	7.65	30,653	42,914		145	211	296	
		04/05/1996	1466	15.9	92.2	15.9	11.13	7.95	26,413	36,979		145	182	255	
		07/23/1997	1206	14	86.1	14	9.8	7	24,666	34,532		145	170	238	
		12/17/1998	1225	19.1	64.1	19.1	13.37	9.55	18,363	25,709		145	127	177	
NLF	R2	07/23/1941	1730	29.5	58.6	29.5	20.65	14.75	16,788	23,503		90	187	261	
		06/21/1945	1520	8	190	8	5.6	4	54,431	76,203		90	605	847	
		12/18/1946	1352	6	225.3	6	4.2	3	64,544	90,361		90	717	1,004	
		10/29/1947	**1680**	**6.4**	**262.5**	**6.4**	**4.48**	**3.2**	**75,201**	**105,281**	**22,050**	**90**	**836**	**1,170**	**245**
		06/20/1949	**1672**	**9**	**185.8**	**9**	**6.3**	**4.5**	**53,228**	**74,519**	**22,050**	**90**	**591**	**828**	**245**
		05/23/1950	1152	45.5	25.3	45.5	31.85	22.75	7,248	10,147		90	81	113	
		10/16/1950	672	8.1	83	8.1	5.67	4.05	23,778	33,289		90	264	370	
		01/19/1951	1310	6	218.3	6	4.2	3	62,538	87,553		90	695	973	
		09/28/1951	328	4	82	4	2.8	2	23,491	32,888		90	261	365	
		06/06/1952	1200	11	109.1	11	7.7	5.5	31,255	43,757		90	347	486	
		01/15/1955	1010	19.5	51.8	19.5	13.65	9.75	14,840	20,775		90	165	231	
		03/03/1955	1119	19.1	58.6	19.1	13.37	9.55	16,788	23,503		90	187	261	
		10/18/1955	620	38.7	16	38.7	27.09	19.35	4,584	6,417		90	51	71	
		09/19/1956	588	22.4	26.3	22.4	15.68	11.2	7,534	10,548		90	84	117	
		08/01/1957	429	8.3	51.7	8.3	5.81	4.15	14,811	20,735		90	165	230	
		09/24/1957	600	28	21.4	28	19.6	14	6,131	8,583		90	68	95	
		08/18/1959	660	34.7	19	34.7	24.29	17.35	5,443	7,620		90	60	85	
		08/18/1960	538	32.4	16.6	32.4	22.68	16.2	4,756	6,658		90	53	74	
		09/11/1961	362	7.6	47.6	7.6	5.32	3.8	13,636	19,091		90	152	212	

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Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
		06/13/1962	660	11.6	56.9	11.6	8.12	5.8	16,301	22,821		90	181	254	
		05/06/1963	880	14.6	60.3	14.6	10.22	7.3	17,275	24,184		90	192	269	
		09/21/1964	725	16.4	44.2	16.4	11.48	8.2	12,662	17,727		90	141	197	
		08/05/1965	491	12.1	40.6	12.1	8.47	6.05	11,631	16,283		90	129	181	
		10/12/1967	523	10.2	51.3	10.2	7.14	5.1	14,696	20,575		90	163	229	
		08/07/1968	588	8.5	69.2	8.5	5.95	4.25	19,824	27,754		90	220	308	
		08/16/1971	545	2.1	259.5	2.1	1.47	1.05	74,341	104,078		90	826	1,156	
		06/21/1972	548	1.9	288.4	1.9	1.33	0.95	82,620	115,668		90	918	1,285	
		10/20/1975	460	1.8	255.6	1.8	1.26	0.9	73,224	102,513		90	814	1,139	
		04/07/1977	714	3.4	210	3.4	2.38	1.7	60,160	84,225		90	668	936	
		09/30/1980	708	2.7	262.2	2.7	1.89	1.35	75,115	105,160		90	835	1,168	
NLF	S	08/25/1937	1220	15	81.3	15	10.5	7.5	23,291	32,607		145	161	225	
		08/01/1938	1113	10.9	102.1	10.9	7.63	5.45	29,249	40,949		145	202	282	
		08/03/1938	1195	12	99.6	12	8.4	6	28,533	39,947		145	197	275	
		07/17/1940	1052	11.3	93.1	11.3	7.91	5.65	26,671	37,340		145	184	258	
		09/25/1940	1173	13	90.2	13	9.1	6.5	25,840	36,176		145	178	249	
		07/23/1941	1278	12	106.5	12	8.4	6	30,510	42,714		145	210	295	
		06/28/1945	1183	14.5	81.6	14.5	10.15	7.25	23,377	32,727		145	161	226	
		07/01/1946	1135	23.5	48.3	23.5	16.45	11.75	13,837	19,372		145	95	134	
		12/18/1946	**1028**	**5**	**205.6**	**5**	**3.5**	**2.5**	**58,900**	**82,460**	**54,375**	**145**	**406**	**569**	**375**
		10/17/1947	1400	22.5	62.2	22.5	15.75	11.25	17,819	24,947		145	123	172	
		09/15/1948	1350	26	51.9	26	18.2	13	14,868	20,816		145	103	144	
		06/17/1949	1415	24	59	24	16.8	12	16,902	23,663		145	117	163	
		05/24/1950	1385	25	55.4	25	17.5	12.5	15,871	22,219		145	109	153	
		10/03/1950	1120	29.5	38	29.5	20.65	14.75	10,886	15,241		145	75	105	
		07/17/1952	1146	24.5	46.8	24.5	17.15	12.25	13,407	18,770		145	92	129	
		07/07/1953	913	13.5	67.6	13.5	9.45	6.75	19,366	27,112		145	134	187	
		05/14/1954	1320	24	55	24	16.8	12	15,756	22,059		145	109	152	
		02/23/1955	1101	20.8	52.9	20.8	14.56	10.4	15,155	21,217		145	105	146	
		03/07/1955	1293	21	61.6	21	14.7	10.5	17,647	24,706		145	122	170	
		11/14/1955	457	7.6	60.1	7.6	5.32	3.8	17,217	24,104		145	119	166	
		07/03/1958	1330	12	110.8	12	8.4	6	31,742	44,439		145	219	306	
		10/15/1958	726	7.5	96.8	7.5	5.25	3.75	27,731	38,824		145	191	268	
		07/23/1959	731	8.1	90.2	8.1	5.67	4.05	25,840	36,176		145	178	249	
		07/26/1960	695	7.8	89.1	7.8	5.46	3.9	25,525	35,735		145	176	246	
		08/17/1961	669	6.8	98.4	6.8	4.76	3.4	28,189	39,465		145	194	272	
		05/29/1962	721	6.2	116.3	6.2	4.34	3.1	33,317	46,644		145	230	322	
		04/22/1963	726	6.4	113.4	6.4	4.48	3.2	32,487	45,481		145	224	314	
		08/19/1964	658	6.4	102.8	6.4	4.48	3.2	29,450	41,230		145	203	284	
		08/18/1965	674	6.2	108.7	6.2	4.34	3.1	31,140	43,596		145	215	301	
		10/12/1967	638	5.6	113.9	5.6	3.92	2.8	32,630	45,682		145	225	315	
		08/06/1968	716	6.2	115.5	6.2	4.34	3.1	33,088	46,324		145	228	319	
		09/10/1968	721	6.4	112.7	6.4	4.48	3.2	32,286	45,201		145	223	312	
		08/06/1969	783	6.8	115.1	6.8	4.76	3.4	32,974	46,163		145	227	318	
		08/24/1970	1047	8.8	119	8.8	6.16	4.4	34,091	47,727		145	235	329	
		08/19/1971	1021	8.6	118.7	8.6	6.02	4.3	34,005	47,607		145	235	328	
		06/21/1972	1139	10.8	105.5	10.8	7.56	5.4	30,223	42,313		145	208	292	
		08/14/1973	**1169**	**9**	**129.9**	**9**	**6.3**	**4.5**	**37,214**	**52,099**	**54,375**	**145**	**257**	**359**	**375**
		01/14/1975	1082	9	120.2	9	6.3	4.5	34,435	48,209		145	237	332	
		05/13/1976	1115	44.2	25.2	44.2	30.94	22.1	7,219	10,107		145	50	70	

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		04/07/1977	1011	9.4	107.6	9.4	6.58	4.7	30,825	43,155		145	213	298	
		08/15/1978	1035	45.5	22.7	45.5	31.85	22.75	6,503	9,104		145	45	63	
		09/24/1981	937	11.4	82.2	11.4	7.98	5.7	23,549	32,968		145	162	227	
		08/19/1982	1078	9.5	113.5	9.5	6.65	4.75	32,515	45,521		145	224	314	
NLF	S2	09/20/1940	2630	26	101.2	26	18.2	13	28,992	40,588	54,375	145	200	280	375
		07/24/1941	3055	32.2	94.9	32.2	22.54	16.1	27,187	38,061		145	187	262	
		06/12/1945	2775	50.4	55.1	50.4	35.28	25.2	15,785	22,099		145	109	152	
		07/24/1946	2630	28	93.9	28	19.6	14	26,900	37,660		145	186	260	
		12/17/1946	2380	49.8	47.8	49.8	34.86	24.9	13,694	19,171		145	94	132	
		03/31/1947	2940	40	73.5	40	28	20	21,056	29,479		145	145	203	
		10/18/1947	2630	48	54.8	48	33.6	24	15,699	21,979		145	108	152	
		09/15/1948	2130	54	39.4	54	37.8	27	11,287	15,802		145	78	109	
		06/17/1949	2090	46	45.4	46	32.2	23	13,006	18,209		145	90	126	
		05/24/1950	1970	41	48	41	28.7	20.5	13,751	19,251		145	95	133	
		10/03/1950	1420	45.3	31.3	45.3	31.71	22.65	8,967	12,553		145	62	87	
		01/19/1951	2130	50	42.6	50	35	25	12,204	17,086		145	84	118	
		05/15/1954	2040	32.5	62.8	32.5	22.75	16.25	17,991	25,187		145	124	174	
		02/16/1955	1466	28.3	51.8	28.3	19.81	14.15	14,840	20,775		145	102	143	
		03/07/1955	1692	27.3	62	27.3	19.11	13.65	17,762	24,866		145	122	171	
		11/04/1955	1201	31	38.7	31	21.7	15.5	11,087	15,521		145	76	107	
		12/30/1955	1950	20	97.5	20	14	10	27,932	39,104		145	193	270	
		09/27/1956	1448	43.5	33.3	43.5	30.45	21.75	9,540	13,356		145	66	92	
		08/02/1957	1337	35.9	37.2	35.9	25.13	17.95	10,657	14,920		145	73	103	
		10/09/1957	1605	43	37.3	43	30.1	21.5	10,686	14,960		145	74	103	
		07/03/1958	1800	44	40.9	44	30.8	22	11,717	16,404		145	81	113	
		10/10/1958	1485	39.4	37.7	39.4	27.58	19.7	10,800	15,120		145	74	104	
		07/23/1959	1305	39.6	33	39.6	27.72	19.8	9,454	13,235		145	65	91	
		07/19/1960	1120	31	36.1	31	21.7	15.5	10,342	14,479		145	71	100	
		08/17/1961	1178	27	43.6	27	18.9	13.5	12,490	17,487		145	86	121	
		06/14/1962	1225	30.9	39.6	30.9	21.63	15.45	11,345	15,882		145	78	110	
		04/22/1963	1406	30	46.9	30	21	15	13,436	18,810		145	93	130	
		07/28/1964	1016	29	35	29	20.3	14.5	10,027	14,037		145	69	97	
		08/18/1965	1142	24.8	46	24.8	17.36	12.4	13,178	18,449		145	91	127	
		01/09/1967	1748	26	67.2	26	18.2	13	19,251	26,952		145	133	186	
		10/12/1967	1634	26	62.8	26	18.2	13	17,991	25,187		145	124	174	
		08/05/1968	1455	24.8	58.7	24.8	17.36	12.4	16,816	23,543		145	116	162	
		08/06/1969	1490	30.6	48.7	30.6	21.42	15.3	13,951	19,532		145	96	135	
		08/24/1970	2194	29.8	73.6	29.8	20.86	14.9	21,085	29,519		145	145	204	
		08/19/1971	2308	32.2	71.7	32.2	22.54	16.1	20,540	28,757		145	142	198	
		07/26/1972	2206	30.6	72.1	30.6	21.42	15.3	20,655	28,917		145	142	199	
		08/14/1973	1783	18	99.1	18	12.6	9	28,390	39,746		145	196	274	
		01/15/1975	2251	52.2	43.1	52.2	36.54	26.1	12,347	17,286		145	85	119	
		05/13/1976	1554	47.6	32.6	47.6	33.32	23.8	9,339	13,075		145	64	90	
		04/06/1977	2001	22	91	22	15.4	11	26,070	36,497		145	180	252	
		06/21/1978	2613	48	54.4	48	33.6	24	15,584	21,818		145	107	150	
		09/24/1981	1824	21.8	83.7	21.8	15.26	10.9	23,978	33,570		145	165	232	
		07/27/1982	1790	21.9	81.7	21.9	15.33	10.95	23,405	32,767		145	161	226	
		05/30/1984	1813	22.2	81.7	22.2	15.54	11.1	23,405	32,767		145	161	226	

TABLE B-2

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Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
NLF	S3	04/11/1951	939	57	16.5	57	39.9	28.5	4,727	6,618		145	33	46	
		07/07/1953	766	72.3	10.6	72.3	50.61	36.15	3,037	4,251		145	21	29	
		07/23/1954	844	57	14.8	57	39.9	28.5	4,240	5,936		145	29	41	
		03/03/1955	928	45.5	20.4	45.5	31.85	22.75	5,844	8,182		145	40	56	
		03/07/1955	871	45	19.4	45	31.5	22.5	5,558	7,781		145	38	54	
		11/04/1955	736	53.5	13.8	53.5	37.45	26.75	3,953	5,535		145	27	38	
		08/03/1956	700	60.5	11.6	60.5	42.35	30.25	3,323	4,652		145	23	32	
		07/24/1957	674	57.5	11.7	57.5	40.25	28.75	3,352	4,693		145	23	32	
		10/02/1957	594	82	7.2	82	57.4	41	2,063	2,888		145	14	20	
		08/16/1961	576	58.1	9.9	58.1	40.67	29.05	2,836	3,971		145	20	27	
		06/14/1962	695	50.8	13.7	50.8	35.56	25.4	3,925	5,495		145	27	38	
		06/06/1963	786	31.2	25.2	31.2	21.84	15.6	7,219	10,107		145	50	70	
		08/19/1964	716	36.5	19.6	36.5	25.55	18.25	5,615	7,861		145	39	54	
		08/18/1965	720	35.2	20.5	35.2	24.64	17.6	5,873	8,222		145	41	57	
		09/11/1968	**945**	**7.3**	**129.5**	**7.3**	**5.11**	**3.65**	**37,099**	**51,939**	**79,750**	**145**	**256**	**358**	**550**
		08/06/1969	1033	8.4	123	8.4	5.88	4.2	35,237	49,332		145	243	340	
		08/24/1970	1047	8.8	119	8.8	6.16	4.4	34,091	47,727		145	235	329	
		08/19/1971	1040	8.4	123.8	8.4	5.88	4.2	35,466	49,652		145	245	342	
		06/12/1972	1042	8.8	118.4	8.8	6.16	4.4	33,919	47,487		145	234	327	
		08/14/1973	1045	8.8	118.8	8.8	6.16	4.4	34,034	47,647		145	235	329	
		01/14/1975	**1016**	**7.9**	**128.6**	**7.9**	**5.53**	**3.95**	**36,841**	**51,578**	**79,750**	**145**	**254**	**356**	**550**
		04/14/1977	1007	8.6	117.1	8.6	6.02	4.3	33,547	46,965		145	231	324	
		06/21/1978	587	6.1	96.2	6.1	4.27	3.05	27,559	38,583		145	190	266	
		09/24/1981	632	6.8	92.9	6.8	4.76	3.4	26,614	37,259		145	184	257	
		07/26/1982	649	6	108.2	6	4.2	3	30,997	43,396		145	214	299	
		05/29/1984	649	6.9	94.1	6.9	4.83	3.45	26,958	37,741		145	186	260	
		05/22/1986	639	8	79.9	8	5.6	4	22,890	32,045		145	158	221	
		06/14/1990	433	5	86.6	5	3.5	2.5	24,809	34,733		145	171	240	
		06/04/1991	520	6.1	85.2	6.1	4.27	3.05	24,408	34,171		145	168	236	

Notes:

Kh = horizontal hydraulic conductivity

T = transmissivity

Bold font indicates tests that are least affected by well efficiency issues and therefore provide the best estimate of aquifer parameter values at the given well location.

TABLE B-3

Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Lower Soledad Canyon, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
SCWC	Stadium	07/20/1965	812	8.3	97.8	8.3	5.81	4.15	28,018	39,225		90	311	436	
		06/06/1972	531	1.6	331.9	1.6	1.12	0.8	95,082	133,115		90	1,056	1,479	
		03/19/1974	**1046**	**2.8**	**373.6**	**2.8**	**1.96**	**1.4**	**107,028**	**149,840**	**63,250**	**90**	**1,189**	**1,665**	**550**
		04/10/1975	**965**	**2.8**	**344.6**	**2.8**	**1.96**	**1.4**	**98,720**	**138,209**	**63,250**	**90**	**1,097**	**1,536**	**550**
		04/12/1976	901	3.4	265	3.4	2.38	1.7	75,917	106,283		90	844	1,181	
		07/11/1977	836	4	209	4	2.8	2	59,874	83,824		90	665	931	
		05/10/1978	942	3.9	241.5	3.9	2.73	1.95	69,184	96,858		90	769	1,076	
		04/01/1979	930	3.1	300	3.1	2.17	1.55	85,943	120,321		90	955	1,337	
		09/01/1979	**937**	**3.1**	**302.3**	**3.1**	**2.17**	**1.55**	**86,602**	**121,243**	**63,250**	**90**	**962**	**1,347**	**550**
		09/22/1998	945	3.6	262.5	3.6	2.52	1.8	75,201	105,281		90	836	1,170	
VWC	U4	07/27/1967	1383	13.1	105.6	13.1	9.17	6.55	30,252	42,353		115	263	368	
		08/07/1968	1686	12.4	136	12.4	8.68	6.2	38,961	54,545		115	339	474	
		08/18/1969	**2621**	**10.2**	**257**	**10.2**	**7.14**	**5.1**	**73,625**	**103,075**	**63,250**	**115**	**640**	**896**	**550**
		08/13/1973	**2679**	**8**	**334.9**	**8**	**5.6**	**4**	**95,942**	**134,318**	**63,250**	**115**	**834**	**1,168**	**550**
		10/31/1979	1021	3.8	268.7	3.8	2.66	1.9	76,977	107,767		115	669	937	
		11/10/1980	1123	4.1	273.9	4.1	2.87	2.05	78,466	109,853		115	682	955	
		06/08/1982	1144	4.4	260	4.4	3.08	2.2	74,484	104,278		115	648	907	
		01/29/1985	962	3.8	253.2	3.8	2.66	1.9	72,536	101,551		115	631	883	
		08/18/1986	941	3.9	241.3	3.9	2.73	1.95	69,127	96,778		115	601	842	
		04/21/1988	1080	4.2	257.1	4.2	2.94	2.1	73,654	103,115		115	640	897	
		02/01/1990	1073	3.5	306.6	3.5	2.45	1.75	87,834	122,968		115	764	1,069	
		05/29/1990	1073	3.5	306.6	3.5	2.45	1.75	87,834	122,968		115	764	1,069	
		01/23/1992	978	4.5	217.3	4.5	3.15	2.25	62,252	87,152		115	541	758	
		06/14/1994	1057	4.2	251.7	4.2	2.94	2.1	72,107	100,949		115	627	878	
		04/04/1996	958	3.5	273.7	3.5	2.45	1.75	78,409	109,773		115	682	955	
		07/17/1997	919	3.3	278.5	3.3	2.31	1.65	79,784	111,698		115	694	971	
		12/29/1998	**1198**	**5.3**	**226**	**5.3**	**3.71**	**2.65**	**64,744**	**90,642**		**115**	**563**	**788**	
VWC	U3	07/27/1967	1389	9	154.3	9	6.3	4.5	44,204	61,885		115	384	538	
		08/07/1968	784	9	87.1	9	6.3	4.5	24,952	34,933		115	217	304	
		08/15/1973	**1997**	**4.7**	**424.9**	**4.7**	**3.29**	**2.35**	**121,725**	**170,414**	**63,250**	**115**	**1,058**	**1,482**	**550**
		10/21/1975	1087	3	362.3	3	2.1	1.5	103,791	145,307		115	903	1,264	
		08/02/1976	997	2.9	343.8	2.9	2.03	1.45	98,491	137,888		115	856	1,199	
		06/13/1977	907	4.1	221.2	4.1	2.87	2.05	63,369	88,717		115	551	771	
		05/31/1978	1074	4.3	249.8	4.3	3.01	2.15	71,562	100,187		115	622	871	
		10/31/1979	939	3.5	268.3	3.5	2.45	1.75	76,862	107,607		115	668	936	
		11/10/1980	898	3.4	264.1	3.4	2.38	1.7	75,659	105,922		115	658	921	
		06/08/1982	1181	4	295.3	4	2.8	2	84,597	118,436		115	736	1,030	
		01/28/1985	**1276**	**4**	**319**	**4**	**2.8**	**2**	**91,387**	**127,941**	**63,250**	**115**	**795**	**1,113**	**550**
		08/18/1986	961	3.2	300.3	3.2	2.24	1.6	86,029	120,441		115	748	1,047	
		04/21/1988	**1249**	**3.6**	**346.9**	**3.6**	**2.52**	**1.8**	**99,379**	**139,131**	**63,250**	**115**	**864**	**1,210**	**550**
		02/01/1990	**1253**	**3**	**417.7**	**3**	**2.1**	**1.5**	**119,662**	**167,527**	**63,250**	**115**	**1,041**	**1,457**	**550**
		05/29/1990	1162	3	387.3	3	2.1	1.5	110,953	155,334		115	965	1,351	
		01/24/1992	1078	5.2	207.3	5.2	3.64	2.6	59,387	83,142		115	516	723	
		07/18/1994	1217	3.9	312.1	3.9	2.73	1.95	89,410	125,174		115	777	1,088	
		04/04/1996	979	2.9	337.6	2.9	2.03	1.45	96,715	135,401		115	841	1,177	
		07/17/1997	861	2.6	331.2	2.6	1.82	1.3	94,882	132,834		115	825	1,155	
		01/18/1999	**1224**	**3.6**	**340**	**3.6**	**2.52**	**1.8**	**97,403**	**136,364**	**63,250**	**115**	**847**	**1,186**	**550**
SCWC	Honby	07/23/1965	613	26.4	23.2	26.4	18.48	13.2	6,646	9,305		90	74	103	
		06/02/1972	712	4	178	4	2.8	2	50,993	71,390		90	567	793	
		06/05/1972	781	14.4	54.2	14.4	10.08	7.2	15,527	21,738		90	173	242	
		04/02/1974	684	14.6	46.8	14.6	10.22	7.3	13,407	18,770		90	149	209	
		04/16/1975	654	14.2	46.1	14.2	9.94	7.1	13,207	18,489		90	147	205	

TABLE B-3

Specific Capacity Data from Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Lower Soledad Canyon, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
		04/13/1976	623	3.5	178	3.5	2.45	1.75	50,993	71,390		90	567	793	
		05/03/1976	674	13.8	48.8	13.8	9.66	6.9	13,980	19,572		90	155	217	
		07/28/1977	801	16.5	48.5	16.5	11.55	8.25	13,894	19,452		90	154	216	
		08/25/1977	702	7.2	97.5	7.2	5.04	3.6	27,932	39,104		90	310	434	
		05/11/1978	**970**	**8.2**	**118.3**	**8.2**	**5.74**	**4.1**	**33,890**	**47,447**	**49,500**	**90**	**377**	**527**	**550**
		05/25/1978	835	18.4	45.4	18.4	12.88	9.2	13,006	18,209		90	145	202	
		04/01/1979	1065	13.7	77.7	13.7	9.59	6.85	22,259	31,163		90	247	346	
		09/01/1979	**1080**	**8.9**	**121.3**	**8.9**	**6.23**	**4.45**	**34,750**	**48,650**	**49,500**	**90**	**386**	**541**	**550**
		08/19/1980	**1178**	**12**	**98.2**	**12**	**8.4**	**6**	**28,132**	**39,385**	**49,500**	**90**	**313**	**438**	**550**
		08/22/1980	914	29.6	30.9	29.6	20.72	14.8	8,852	12,393		90	98	138	
		11/18/1981	919	48	19.1	48	33.6	24	5,472	7,660		90	61	85	
		12/01/1981	1277	13.4	95.3	13.4	9.38	6.7	27,301	38,222		90	303	425	
		03/14/1983	868	35	24.8	35	24.5	17.5	7,105	9,947		90	79	111	
		08/24/1983	1287	16.7	77.1	16.7	11.69	8.35	22,087	30,922		90	245	344	
		07/24/1984	832	48.1	17.3	48.1	33.67	24.05	4,956	6,939		90	55	77	
		08/02/1984	1232	14.5	85	14.5	10.15	7.25	24,351	34,091		90	271	379	
		10/22/1985	756	46.2	16.4	46.2	32.34	23.1	4,698	6,578		90	52	73	
		10/24/1985	1217	15.1	80.6	15.1	10.57	7.55	23,090	32,326		90	257	359	
		09/22/1998	904	10.2	88.6	10.2	7.14	5.1	25,382	35,535		90	282	395	

Notes:

Kh = horizontal hydraulic conductivity

T = transmissivity

Bold font indicates tests that are least affected by well efficiency issues and therefore provide the best estimate of aquifer parameter values at the given well location.

TABLE B-4

Specific Capacity Data From Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Upper Soledad Canyon, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
SCWC	N. Oaks West	06/05/1972	1245	17.8	69.9	17.8	12.46	8.9	20,025	28,035		90	222	311	
		08/05/1972	1527	18.6	82.1	18.6	13.02	9.3	23,520	32,928		90	261	366	
		03/20/1974	1578	17.8	88.7	17.8	12.46	8.9	25,411	35,575		90	282	395	
		04/07/1975	1407	12.6	111.7	12.6	8.82	6.3	32,000	44,799		90	356	498	
		04/15/1976	1232	10.6	116.2	10.6	7.42	5.3	33,289	46,604		90	370	518	
		08/24/1977	578	7.2	80.3	7.2	5.04	3.6	23,004	32,206		90	256	358	
		06/07/1978	1392	12	116	12	8.4	6	33,231	46,524		90	369	517	
		04/01/1979	1298	10.8	120.2	10.8	7.56	5.4	34,435	48,209		90	383	536	
		09/01/1979	1185	9.7	122.2	9.7	6.79	4.85	35,008	49,011		90	389	545	
		08/02/1980	1317	11.4	115.5	11.4	7.98	5.7	33,088	46,324		90	368	515	
		12/01/1981	1598	13.4	119.3	13.4	9.38	6.7	34,177	47,848		90	380	532	
		03/07/1983	**1598**	**12.5**	**127.8**	**12.5**	**8.75**	**6.25**	**36,612**	**51,257**	**49,500**	**90**	**407**	**570**	**550**
		07/31/1984	**1558**	**12**	**129.8**	**12**	**8.4**	**6**	**37,185**	**52,059**	**49,500**	**90**	**413**	**578**	**550**
		10/23/1985	**1538**	**11.4**	**134.9**	**11.4**	**7.98**	**5.7**	**38,646**	**54,104**	**49,500**	**90**	**429**	**601**	**550**
		09/17/1998	1405	11.7	120.1	11.7	8.19	5.85	34,406	48,168		90	382	535	
SCWC	N. Oaks Central	03/26/1974	989	3.8	260.3	3.8	2.66	1.9	74,570	104,398		90	829	1,160	
		04/07/1975	823	3	274.3	3	2.1	1.5	78,581	110,013		90	873	1,222	
		04/13/1976	861	3.3	260.9	3.3	2.31	1.65	74,742	104,639		90	830	1,163	
		07/14/1977	759	4.5	168.7	4.5	3.15	2.25	48,329	67,660		90	537	752	
		05/18/1978	1023	3.6	284.2	3.6	2.52	1.8	81,417	113,984		90	905	1,266	
		04/01/1979	953	3.7	257.6	3.7	2.59	1.85	73,797	103,316		90	820	1,148	
		09/01/1979	930	1.3	715.4	1.3	0.91	0.65	204,947	286,925		90	2,277	3,188	
		08/27/1980	1021	3.5	291.7	3.5	2.45	1.75	83,566	116,992		90	929	1,300	
		11/19/1981	1078	3.8	283.7	3.8	2.66	1.9	81,274	113,783		90	903	1,264	
		03/07/1983	1139	3.4	335	3.4	2.38	1.7	95,970	134,358		90	1,066	1,493	
		07/26/1984	1164	3.5	332.6	3.5	2.45	1.75	95,283	133,396		90	1,059	1,482	
		10/23/1985	1087	3	362.3	3	2.1	1.5	103,791	145,307		90	1,153	1,615	
		09/17/1998	**1450**	**4.8**	**302.1**	**4.8**	**3.36**	**2.4**	**86,545**	**121,163**	**49,500**	**90**	**962**	**1,346**	**550**
SCWC	N. Oaks East	11/27/1963	1099	8.9	123.5	8.9	6.23	4.45	35,380	49,532		90	393	550	
		08/24/1965	707	42.1	16.8	42.1	29.47	21.05	4,813	6,738		90	53	75	
		06/02/1972	1169	8.5	137.5	8.5	5.95	4.25	39,391	55,147		90	438	613	
		03/20/1974	1016	6.5	156.3	6.5	4.55	3.25	44,777	62,687		90	498	697	
		04/15/1975	842	4.8	175.4	4.8	3.36	2.4	50,248	70,348		90	558	782	
		04/13/1976	873	5.3	164.7	5.3	3.71	2.65	47,183	66,056		90	524	734	
		07/14/1977	699	6.3	111	6.3	4.41	3.15	31,799	44,519		90	353	495	
		06/07/1978	750	4.4	170.5	4.4	3.08	2.2	48,845	68,382		90	543	760	
		04/01/1979	578	3.1	186.5	3.1	2.17	1.55	53,428	74,799		90	594	831	
		09/01/1979	510	2.2	231.8	2.2	1.54	1.1	66,406	92,968		90	738	1,033	
		08/25/1980	531	3.2	165.9	3.2	2.24	1.6	47,527	66,537		90	528	739	
		11/19/1981	1312	10.6	123.8	10.6	7.42	5.3	35,466	49,652		90	394	552	
		03/23/1983	**1312**	**7.6**	**172.6**	**7.6**	**5.32**	**3.8**	**49,446**	**69,225**	**49,500**	**90**	**549**	**769**	**550**
		07/30/1984	1261	8	157.6	8	5.6	4	45,149	63,209		90	502	702	
		11/18/1985	1143	7.3	156.6	7.3	5.11	3.65	44,862	62,807		90	498	698	
		09/17/1998	1091	18.4	59.3	18.4	12.88	9.2	16,988	23,783		90	189	264	

TABLE B-4

Specific Capacity Data From Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer in Upper Soledad Canyon, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft^2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
SCWC	Sierra	**03/20/1974**	**1679**	**5.7**	**294.6**	**5.7**	**3.99**	**2.85**	**84,396**	**118,155**	**49,500**	**90**	**938**	**1,313**	**550**
		04/08/1975	1425	5.3	268.9	5.3	3.71	2.65	77,034	107,848		90	856	1,198	
		04/14/1976	1418	5.8	244.5	5.8	4.06	2.9	70,044	98,061		90	778	1,090	
		07/12/1977	1291	8.9	145.1	8.9	6.23	4.45	41,568	58,195		90	462	647	
		05/16/1978	**1574**	**5.4**	**291.5**	**5.4**	**3.78**	**2.7**	**83,508**	**116,912**	**49,500**	**90**	**928**	**1,299**	**550**
		04/01/1979	1538	4.9	313.9	4.9	3.43	2.45	89,926	125,896		90	999	1,399	
		09/01/1979	1507	5.5	274	5.5	3.85	2.75	78,495	109,893		90	872	1,221	
		08/25/1980	1558	4.6	338.7	4.6	3.22	2.3	97,030	135,842		90	1,078	1,509	
		11/30/1981	1448	4.2	344.8	4.2	2.94	2.1	98,778	138,289		90	1,098	1,537	
		03/15/1983	**1950**	**5.5**	**354.5**	**5.5**	**3.85**	**2.75**	**101,557**	**142,179**	**49,500**	**90**	**1,128**	**1,580**	**550**
		07/26/1984	1860	16.8	110.7	16.8	11.76	8.4	31,713	44,398		90	352	493	
		10/29/1985	**1840**	**6.4**	**287.5**	**6.4**	**4.48**	**3.2**	**82,362**	**115,307**	**49,500**	**90**	**915**	**1,281**	**550**
		09/16/1998	851	3.3	257.9	3.3	2.31	1.65	73,883	103,436		90	821	1,149	
SCWC	Mitchell	07/19/1965	536	11.4	47	11.4	7.98	5.7	13,464	18,850		90	150	209	
		08/07/1972	1250	6.5	192.3	6.5	4.55	3.25	55,090	77,126		90	612	857	
		03/26/1974	627	2.8	223.9	2.8	1.96	1.4	64,142	89,799		90	713	998	
		04/08/1975	529	2.6	203.5	2.6	1.82	1.3	58,298	81,618		90	648	907	
		08/25/1977	**709**	**5**	**141.8**	**5**	**3.5**	**2.5**	**40,623**	**56,872**	**49,500**	**90**	**451**	**632**	**550**
		07/25/1978	613	7.7	79.6	7.7	5.39	3.85	22,804	31,925		90	253	355	
		04/01/1979	653	8.7	75.1	8.7	6.09	4.35	21,515	30,120		90	239	335	
		09/01/1979	660	9	73.3	9	6.3	4.5	20,999	29,398		90	233	327	
		08/25/1980	602	9.8	61.4	9.8	6.86	4.9	17,590	24,626		90	195	274	
		11/23/1981	664	11	60.4	11	7.7	5.5	17,303	24,225		90	192	269	
		05/23/1983	674	12.3	54.8	12.3	8.61	6.15	15,699	21,979		90	174	244	
		08/02/1984	689	25.8	26.7	25.8	18.06	12.9	7,649	10,709		90	85	119	
		10/24/1985	694	39	17.8	39	27.3	19.5	5,099	7,139		90	57	79	
		09/22/1998	593	14.3	41.5	14.3	10.01	7.15	11,889	16,644		90	132	185	
SCWC	Lost Canyon 2	04/01/1979	743	17.3	42.9	17.3	12.11	8.65	12,290	17,206	36,000	90	137	191	400
		09/01/1979	885	28	31.6	28	19.6	14	9,053	12,674		90	101	141	
		09/16/1998	799	22.1	36.2	22.1	15.47	11.05	10,371	14,519		90	115	161	
SCWC	Lost Canyon 2A	10/29/1997	834	12.4	67.3	12.4	8.68	6.2	19,280	26,992	36,000	90	214	300	400
SCWC	Sand Canyon	07/02/1975	648	2.7	240	2.7	1.89	1.35	68,755	96,257		90	764	1,070	
		04/01/1979	540	2.5	216	2.5	1.75	1.25	61,879	86,631		90	688	963	
		09/01/1979	**825**	**2.6**	**317.3**	**2.6**	**1.82**	**1.3**	**90,900**	**127,259**	**36,000**	**90**	**1,010**	**1,414**	**400**
		08/22/1980	709	3.2	221.6	3.2	2.24	1.6	63,484	88,877		90	705	988	
		11/18/1981	684	3.4	201.2	3.4	2.38	1.7	57,639	80,695		90	640	897	
		05/23/1983	714	3.2	223.1	3.2	2.24	1.6	63,913	89,479		90	710	994	
		07/24/1984	**774**	**4.2**	**184.3**	**4.2**	**2.94**	**2.1**	**52,798**	**73,917**	**36,000**	**90**	**587**	**821**	**400**
		10/22/1985	658	3.3	199.4	3.3	2.31	1.65	57,124	79,973		90	635	889	
		09/16/1998	**1147**	**9.3**	**123.3**	**9.3**	**6.51**	**4.65**	**35,323**	**49,452**	**36,000**	**90**	**392**	**549**	**400**
NCWD	Pinetree1	04/02/1999	297	13.7	21.7	13.7	9.59	6.85	6,217	8,703	31,500	90	69	97	350
NCWD	Pinetree3	**04/02/1999**	**554**	**4.7**	**117.9**	**4.7**	**3.29**	**2.35**	**33,776**	**47,286**	**31,500**	**90**	**375**	**525**	**350**
NCWD	Pinetree4	**04/02/1999**	**497**	**4.8**	**103.5**	**4.8**	**3.36**	**2.4**	**29,650**	**41,511**	**31,500**	**90**	**329**	**461**	**350**

Notes:

Kh = horizontal hydraulic conductivity

T = transmissivity

Bold font indicates tests that are least affected by well efficiency issues and therefore provide the best estimate of aquifer parameter values at the given well location.

TABLE B-5

Specific Capacity Data From Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer Along Castaic Creek, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
VWC	D	05/29/1984	503	6	83.8	6	4.2	3	24,007	33,610		100	240	336	
		04/27/1988	**1171**	**10.1**	**115.9**	**10.1**	**7.07**	**5.05**	**33,203**	**46,484**	**35,000**	**100**	**332**	**465**	**350**
		05/29/1990	990	9.5	104.2	9.5	6.65	4.75	29,851	41,791		100	299	418	
		07/06/1994	**1119**	**9.6**	**116.6**	**9.6**	**6.72**	**4.8**	**33,403**	**46,765**	**35,000**	**100**	**334**	**468**	**350**
		04/29/1996	1105	9.8	112.8	9.8	6.86	4.9	32,315	45,241		100	323	452	
		09/15/1997	1135	9.7	117	9.7	6.79	4.85	33,518	46,925		100	335	469	
		11/03/1998	**1086**	**9.6**	**113.1**	**9.6**	**6.72**	**4.8**	**32,401**	**45,361**	**35,000**	**100**	**324**	**454**	**350**
		11/13/1998	1086	9.6	113.1	9.6	6.72	4.8	32,401	45,361		100	324	454	
NLF	E	**04/10/1984**	**1726**	**7.8**	**221.3**	**7.8**	**5.46**	**3.9**	**63,398**	**88,757**	**35,000**	**100**	**634**	**888**	**350**
		05/21/1986	1613	7.1	227.2	7.1	4.97	3.55	65,088	91,123		100	651	911	
		10/14/1987	1151	15.6	73.8	15.6	10.92	7.8	21,142	29,599		100	211	296	
		10/05/1988	766	11	69.6	11	7.7	5.5	19,939	27,914		100	199	279	
		07/11/1989	877	8.2	107	8.2	5.74	4.1	30,653	42,914		100	307	429	
		05/30/1990	1291	13.9	92.9	13.9	9.73	6.95	26,614	37,259		100	266	373	
		04/17/1991	1187	15.8	75.1	15.8	11.06	7.9	21,515	30,120		100	215	301	
		06/03/1992	**1732**	**7.9**	**219.2**	**7.9**	**5.53**	**3.95**	**62,796**	**87,914**	**35,000**	**100**	**628**	**879**	**350**
		07/20/1993	1613	7.4	218	7.4	5.18	3.7	62,452	87,433		100	625	874	
		07/20/1994	1603	7.6	210.9	7.6	5.32	3.8	60,418	84,586		100	604	846	
		07/12/1995	1644	7.4	222.2	7.4	5.18	3.7	63,655	89,118		100	637	891	
		05/14/1996	1613	7.9	204.2	7.9	5.53	3.95	58,499	81,898		100	585	819	
		04/23/1997	1583	9.9	159.9	9.9	6.93	4.95	45,808	64,131		100	458	641	
		05/06/1998	1501	6.8	220.7	6.8	4.76	3.4	63,226	88,516		100	632	885	
		05/04/1999	1501	6.9	217.5	6.9	4.83	3.45	62,309	87,233		100	623	872	
		05/21/1999	1501	6.9	217.5	6.9	4.83	3.45	62,309	87,233		100	623	872	
		04/21/2000	1378	11.4	120.9	11.4	7.98	5.7	34,635	48,489		100	346	485	
NLF	E2	07/29/1938	1921	20.7	92.8	20.7	14.49	10.35	26,585	37,219		100	266	372	
		08/05/1938	1625	18.5	87.8	18.5	12.95	9.25	25,153	35,214		100	252	352	
		08/11/1938	1630	18.2	89.6	18.2	12.74	9.1	25,668	35,936		100	257	359	
		07/25/1939	1530	15.7	97.5	15.7	10.99	7.85	27,932	39,104		100	279	391	
		08/01/1939	1846	19.1	96.6	19.1	13.37	9.55	27,674	38,743		100	277	387	
		06/13/1941	1905	13.2	144.3	13.2	9.24	6.6	41,339	57,874		100	413	579	
		07/16/1945	**1635**	**9.9**	**165.2**	**9.9**	**6.93**	**4.95**	**47,326**	**66,257**	**35,000**	**100**	**473**	**663**	**350**
		12/18/1946	**1819**	**10**	**181.9**	**10**	**7**	**5**	**52,110**	**72,955**	**35,000**	**100**	**521**	**730**	**350**
		10/28/1947	1760	16.2	108.6	16.2	11.34	8.1	31,112	43,556		100	311	436	
		06/23/1949	1225	12.5	98	12.5	8.75	6.25	28,075	39,305		100	281	393	
		06/07/1950	1070	11	97.3	11	7.7	5.5	27,874	39,024		100	279	390	
		04/11/1951	1095	37.7	29	37.7	26.39	18.85	8,308	11,631		100	83	116	
		08/07/1953	1103	22.4	49.2	22.4	15.68	11.2	14,095	19,733		100	141	197	
		02/10/1955	1481	14.9	99.4	14.9	10.43	7.45	28,476	39,866		100	285	399	
		08/12/1955	1103	22.4	49.2	22.4	15.68	11.2	14,095	19,733		100	141	197	
		09/20/1956	998	28.2	35.4	28.2	19.74	14.1	10,141	14,198		100	101	142	
		07/16/1957	938	29.2	32.1	29.2	20.44	14.6	9,196	12,874		100	92	129	
		10/09/1957	828	11	75.3	11	7.7	5.5	21,572	30,201		100	216	302	
		07/25/1958	1582	12.5	126.6	12.5	8.75	6.25	36,268	50,775		100	363	508	
		10/24/1958	1532	16.6	92.3	16.6	11.62	8.3	26,442	37,019		100	264	370	
		09/03/1959	1329	24.8	53.6	24.8	17.36	12.4	15,355	21,497		100	154	215	
		07/29/1960	1084	39.2	27.7	39.2	27.44	19.6	7,935	11,110		100	79	111	
		08/03/1961	888	20.2	44	20.2	14.14	10.1	12,605	17,647		100	126	176	
		07/17/1962	1503	18.5	81.2	18.5	12.95	9.25	23,262	32,567		100	233	326	
		05/07/1963	1487	16.2	91.8	16.2	11.34	8.1	26,299	36,818		100	263	368	

TABLE B-5

Specific Capacity Data From Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer Along Castaic Creek, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
		07/16/1964	759	47.8	15.9	47.8	33.46	23.9	4,555	6,377		100	46	64	
		08/05/1965	652	34.2	19.1	34.2	23.94	17.1	5,472	7,660		100	55	77	
		11/01/1966	536	60.1	8.9	60.1	42.07	30.05	2,550	3,570		100	25	36	
		08/10/1967	842	9.6	87.7	9.6	6.72	4.8	25,124	35,174		100	251	352	
		09/26/1968	1161	62.5	18.6	62.5	43.75	31.25	5,328	7,460		100	53	75	
		06/23/1972	1345	12.8	105.1	12.8	8.96	6.4	30,109	42,152		100	301	422	
		07/08/1974	1287	17.3	74.4	17.3	12.11	8.65	21,314	29,840		100	213	298	
		05/06/1976	1065	25.5	41.8	25.5	17.85	12.75	11,975	16,765		100	120	168	
		03/14/1977	1056	43.7	24.2	43.7	30.59	21.85	6,933	9,706		100	69	97	
		08/10/1978	725	4.8	151	4.8	3.36	2.4	43,258	60,561		100	433	606	
		12/21/1989	1086	34.6	31.4	34.6	24.22	17.3	8,995	12,594		100	90	126	
		05/30/1990	1205	36.1	33.4	36.1	25.27	18.05	9,568	13,396		100	96	134	
		04/17/1991	1056	48.5	21.8	48.5	33.95	24.25	6,245	8,743		100	62	87	
		06/03/1992	1235	22.9	53.9	22.9	16.03	11.45	15,441	21,618		100	154	216	
		07/20/1993	**1312**	**8.3**	**158.1**	**8.3**	**5.81**	**4.15**	**45,292**	**63,409**	**35,000**	**100**	**453**	**634**	**350**
		07/21/1994	**1305**	**6.3**	**207.1**	**6.3**	**4.41**	**3.15**	**59,330**	**83,061**	**35,000**	**100**	**593**	**831**	**350**
		07/12/1995	**1395**	**6.2**	**225**	**6.2**	**4.34**	**3.1**	**64,458**	**90,241**	**35,000**	**100**	**645**	**902**	**350**
		06/05/1996	**1473**	**5.8**	**254**	**5.8**	**4.06**	**2.9**	**72,765**	**101,872**	**35,000**	**100**	**728**	**1,019**	**350**
		04/23/1997	1087	6.4	169.8	6.4	4.48	3.2	48,644	68,102		100	486	681	
		06/26/1998	1055	8.3	127.1	8.3	5.81	4.15	36,411	50,976		100	364	510	
		05/04/1999	1079	6.6	163.5	6.6	4.62	3.3	46,839	65,575		100	468	656	
		05/21/1999	1079	6.6	163.5	6.6	4.62	3.3	46,839	65,575		100	468	656	
		04/21/2000	1052	6.7	157	6.7	4.69	3.35	44,977	62,968		100	450	630	
WHR	8	04/10/1969	849	5.8	146.4	5.8	4.06	2.9	41,940	58,717	35,000	100	419	587	350
WHR	16	10/06/1955	1205	8.3	145.2	8.3	5.81	4.15	41,597	58,235		100	416	582	
		11/13/1957	1052	7.6	138.4	7.6	5.32	3.8	39,649	55,508		100	396	555	
		05/28/1959	810	6.3	128.6	6.3	4.41	3.15	36,841	51,578		100	368	516	
		06/19/1959	**1436**	**9.9**	**145.1**	**9.9**	**6.93**	**4.95**	**41,568**	**58,195**	**35,000**	**100**	**416**	**582**	**350**
		06/26/1962	**1150**	**7**	**164.3**	**7**	**4.9**	**3.5**	**47,068**	**65,896**	**35,000**	**100**	**471**	**659**	**350**
		12/04/1963	1073	6.9	155.5	6.9	4.83	3.45	44,547	62,366		100	445	624	
WHR	11	11/10/1954	1401	10.9	128.5	10.9	7.63	5.45	36,812	51,537		100	368	515	
		10/06/1955	**1444**	**10.4**	**138.8**	**10.4**	**7.28**	**5.2**	**39,763**	**55,668**	**35,000**	**100**	**398**	**557**	**350**
		03/07/1962	1125	8.5	132.4	8.5	5.95	4.25	37,930	53,102		100	379	531	
		10/31/1962	1288	10.6	121.5	10.6	7.42	5.3	34,807	48,730		100	348	487	
		12/04/1963	1172	8.2	142.9	8.2	5.74	4.1	40,938	57,313		100	409	573	
WHR	18	01/27/1959	1244	9	138.2	9	6.3	4.5	39,591	55,428		100	396	554	
		05/28/1959	**1369**	**9.3**	**147.2**	**9.3**	**6.51**	**4.65**	**42,170**	**59,037**	**35,000**	**100**	**422**	**590**	**350**
		06/26/1962	1262	8	157.8	8	5.6	4	45,206	63,289		100	452	633	
		12/04/1963	940	6	156.7	6	4.2	3	44,891	62,848		100	449	628	
WHR	17	**10/06/1955**	**576**	**3.2**	**180**	**3.2**	**2.24**	**1.6**	**51,566**	**72,193**	**35,000**	**100**	**516**	**722**	**350**
		03/06/1962	539	3.3	163.3	3.3	2.31	1.65	46,782	65,495		100	468	655	
		10/31/1962	536	3.2	167.5	3.2	2.24	1.6	47,985	67,179		100	480	672	
		12/04/1963	**595**	**3.3**	**180.3**	**3.3**	**2.31**	**1.65**	**51,652**	**72,313**	**35,000**	**100**	**517**	**723**	**350**
WHR	10	10/06/1955	442	18.5	23.9	18.5	12.95	9.25	6,847	9,586	35,000	100	68	96	350
		03/06/1962	452	11.1	40.7	11.1	7.77	5.55	11,660	16,324		100	117	163	
		10/31/1962	480	15	32	15	10.5	7.5	9,167	12,834		100	92	128	
		12/03/1963	508	23.6	21.5	23.6	16.52	11.8	6,159	8,623		100	62	86	
		11/13/1964	467	27.1	17.2	27.1	18.97	13.55	4,927	6,898		100	49	69	

TABLE B-5

Specific Capacity Data From Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer Along Castaic Creek, Santa Clarita Valley

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
WHR	15	10/06/1955	815	3.6	226.4	3.6	2.52	1.8	64,859	90,802		100	649	908	
		11/13/1957	1231	6.6	186.5	6.6	4.62	3.3	53,428	74,799		100	534	748	
		06/18/1958	1353	6.8	199	6.8	4.76	3.4	57,009	79,813		100	570	798	
		05/28/1959	**1655**	**9.6**	**172.4**	**9.6**	**6.72**	**4.8**	**49,389**	**69,144**	**35,000**	**100**	**494**	**691**	**350**
		06/18/1959	1353	6.8	199	6.8	4.76	3.4	57,009	79,813		100	570	798	
		06/26/1962	1260	6	210	6	4.2	3	60,160	84,225		100	602	842	
		12/05/1963	1180	7.6	155.3	7.6	5.32	3.8	44,490	62,286		100	445	623	
WHR	5	03/06/1962	684	9.7	70.5	9.7	6.79	4.85	20,197	28,275	35,000	100	202	283	350
		12/03/1963	693	8.8	78.8	8.8	6.16	4.4	22,574	31,604		100	226	316	
NCWD	Castaic1	03/31/1986	580	51.6	11.2	51.6	36.12	25.8	3,209	4,492	25,200	100	32	45	315
		04/23/1999	644	55.2	11.7	55.2	38.64	27.6	3,352	4,693		100	34	47	
NCWD	Castaic4	04/23/1999	271	87.6	3.1	87.6	61.32	43.8	888	1,243	25,200	100	9	12	315
NCWD	Castaic3	04/23/1999	470	41.3	11.4	41.3	28.91	20.65	3,266	4,572	25,200	100	33	46	315
NCWD	Castaic2	04/01/1986	428	37.9	11.3	37.9	26.53	18.95	3,237	4,532	25,200	100	32	45	315

Notes:

Kh = horizontal hydraulic conductivity

T = transmissivity

Bold font indicates tests that are least affected by well efficiency issues and therefore provide the best estimate of aquifer parameter values at the given well location.

TABLE B-6

Specific Capacity Data From Edison Tests, and Transmissivity and Hydraulic Calculations: Alluvial Aquifer In Tributary Canyons, Santa Clarita Valley, CA

Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Owner	Well Name	Test Date	Pumping Rate (gpm)	Measured Drawdown (ft)	Specific Capacity (gpm/ft)	Formation Drawdown (ft) (E=100%)	Formation Drawdown (ft) (E=70%)	Formation Drawdown (ft) (E=50%)	T (ft^2/day) (E=70%)	T (ft^2/day) (E=50%)	Modeled T (ft2/day)	Typical Saturated Thickness (ft)	Kh (ft/day) (E=70%)	Kh (ft/day) (E=50%)	Modeled Kh (ft/day)
NLF	W4	02/05/1992	592	9.4	63	9.4	6.58	4.7	18,048	25,267		100	180	253	
		08/12/1994	**957**	**10.8**	**88.6**	**10.8**	**7.56**	**5.4**	**25,382**	**35,535**	**10,500**	**100**	**254**	**355**	**105**
VWC	W6	11/22/1991	720	36	20	36	25.2	18	5,730	8,021		100	57	80	
		01/27/1992	636	40.5	15.7	40.5	28.35	20.25	4,498	6,297		100	45	63	
		05/11/1994	504	75	6.7	75	52.5	37.5	1,919	2,687		100	19	27	
		04/23/1996	531	71.3	7.4	71.3	49.91	35.65	2,120	2,968		100	21	30	
		07/15/1997	539	69.5	7.8	69.5	48.65	34.75	2,235	3,128		100	22	31	
		12/28/1998	468	83.2	5.6	83.2	58.24	41.6	1,604	2,246		100	16	22	
VWC	W9	04/23/1996	946	10.1	93.7	10.1	7.07	5.05	26,843	37,580		100	268	376	
		07/15/1997	958	10.5	91.2	10.5	7.35	5.25	26,127	36,578		100	261	366	
		12/28/1998	**990**	**10.2**	**97.1**	**10.2**	**7.14**	**5.1**	**27,817**	**38,944**	**10,500**	**100**	**278**	**389**	**105**
SCWC	Guida	**03/18/1974**	**1016**	**6.4**	**158.8**	**6.4**	**4.48**	**3.2**	**45,493**	**63,690**	**12,600**	**90**	**505**	**708**	**140**
		04/17/1975	990	6.2	159.7	6.2	4.34	3.1	45,751	64,051		90	508	712	
		04/19/1976	940	5.6	167.9	5.6	3.92	2.8	48,100	67,340		90	534	748	
		07/06/1977	890.7	5.2	171.3	5.2	3.64	2.6	49,074	68,703		90	545	763	
		05/09/1978	915	5.5	166.4	5.5	3.85	2.75	47,670	66,738		90	530	742	
		04/01/1979	990	6.5	152.3	6.5	4.55	3.25	43,631	61,083		90	485	679	
		09/01/1979	990	3.6	275	3.6	2.52	1.8	78,782	110,294		90	875	1,225	
		08/20/1980	1000	7	142.9	7	4.9	3.5	40,938	57,313		90	455	637	
		11/24/1981	1009	7.2	140.1	7.2	5.04	3.6	40,136	56,190		90	446	624	
		03/15/1983	1024	6.9	148.4	6.9	4.83	3.45	42,513	59,519		90	472	661	
		07/25/1984	**1014**	**6.4**	**158.4**	**6.4**	**4.48**	**3.2**	**45,378**	**63,529**	**12,600**	**90**	**504**	**706**	**140**
		10/28/1985	1044	7.8	133.8	7.8	5.46	3.9	38,331	53,663		90	426	596	
		09/23/1998	1066	9.4	113.4	9.4	6.58	4.7	32,487	45,481		90	361	505	
SCWC	Clark	**06/06/1972**	**814**	**4**	**203.5**	**4**	**2.8**	**2**	**58,298**	**81,618**	**22,050**	**90**	**648**	**907**	**245**
		03/18/1974	587	3.8	154.5	3.8	2.66	1.9	44,261	61,965		90	492	689	
		05/27/1975	541	3.7	146.2	3.7	2.59	1.85	41,883	58,636		90	465	652	
		04/12/1976	490	3.3	148.5	3.3	2.31	1.65	42,542	59,559		90	473	662	
		07/06/1977	500.3	3	166.8	3	2.1	1.5	47,785	66,898		90	531	743	
		05/08/1978	488	3.1	157.4	3.1	2.17	1.55	45,092	63,128		90	501	701	
		04/01/1979	600	3	200	3	2.1	1.5	57,296	80,214		90	637	891	
		09/01/1979	600	2.6	230.8	2.6	1.82	1.3	66,119	92,567		90	735	1,029	
		08/20/1980	573	2.9	197.6	2.9	2.03	1.45	56,608	79,251		90	629	881	
		11/24/1981	602	2.7	223	2.7	1.89	1.35	63,885	89,439		90	710	994	
		03/08/1983	608	2.6	233.8	2.6	1.82	1.3	66,979	93,770		90	744	1,042	
		07/25/1984	608	2.3	264.3	2.3	1.61	1.15	75,716	106,003		90	841	1,178	
		09/23/1998	677	4.4	153.9	4.4	3.08	2.2	44,089	61,725		90	490	686	

Notes:

Kh = horizontal hydraulic conductivity

T = transmissivity

Bold font indicates tests that are least affected by well efficiency issues and therefore provide the best estimate of aquifer parameter values at the given well location.

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Figures—All figures appear at the end of the appendix.

APPENDIX C

Surface Water Routing Model

A Surface Water Routing Model (SWRM) was developed to support groundwater flow modeling efforts in the Santa Clarita Valley of Southern California. The SWRM was developed as a pre- and post-processor for the Santa Clarita Valley Groundwater Model (hereafter called the Regional Model), which was constructed by the Upper Basin Water Purveyors. The Regional Model will be briefly described in this appendix; however, the reader should refer to the main body of this report for a more detailed description of the Regional Model.

C.1 Introduction

The Regional Model simulates monthly groundwater conditions from 1980 through 1999 over a 120 square mile (mi^2) area within a portion of the Santa Clara River Valley East Groundwater Subbasin. This subbasin lies within the Upper Santa Clara River Hydrologic Area, which is a watershed of approximately 460 mi^2 that lies in northwest Los Angeles County and a small portion of eastern Ventura County (Figure C-1).

The outer limits of the Regional Model correspond to the outer limits of the Santa Clarita Valley's groundwater systems, which consist of the Alluvial Aquifer and the Saugus Formation. These aquifers lie in the south-central portion of the hydrologic area, and the watershed extends upstream beyond the outer limits of the groundwater systems. Geologic formations located within the watershed, but outside of the Regional Model area, consist of bedrock and do not transmit significant quantities of groundwater flow due to their low permeability. However, an understanding of the availability of surface water runoff and infiltration within and upstream of the Regional Model area is critical to accurately simulate the water budget through time within the Regional Model area. Therefore, a surface water routing tool was developed to estimate, on a monthly basis, the location, magnitude, and timing of surface water infiltration to groundwater within the Regional Model boundary.

The SWRM was written in the Visual Basic Editor within Microsoft® Excel 97. The remainder of this appendix is organized as follows:

a. A list of the sources of recharge that are evaluated by the SWRM

b. The design of the SWRM

c. Detailed discussions of the calculations of magnitudes of each surface water source and its associated infiltration rate to groundwater

C.2 Sources of Recharge

The sources of recharge to the groundwater system in the Santa Clarita Valley are:

a. Infiltration of applied water for urban and industrial outdoor uses and for irrigating golf courses. Sources of urban and golf course irrigation water are groundwater pumping from the Alluvial Aquifer and the Saugus Formation, and import of water from the State Water Project (SWP).

b. Infiltration of water that is used for agricultural irrigation within the Regional Model area. This source of water consists exclusively of groundwater pumping from the Alluvial Aquifer.

c. Infiltration of direct precipitation within the Regional Model area, which is derived from precipitation data.

d. Infiltration of stormwater and anthropogenic streamflows. These sources include the following:

    1. Surface water runoff and infiltration from portions of the Upper Santa Clara River Hydrologic Area located outside of the Regional Model boundary
    2. Santa Clara River flows that enter the valley from the east
    3. Water released from Castaic Lagoon into Castaic Creek by the California Department of Water Resources
    4. Treated water discharged into the Santa Clara River from two Los Angeles County Sanitation District (LACSD) water reclamation plants (WRP)

C.3 SWRM Design

At every node in the grid that forms the Regional Model domain, the SWRM estimates groundwater recharge terms using the following three basic steps:

1. Calculate the monthly volume of surface water from each water source within and upstream of the Regional Model area.
2. Calculate the monthly volume of water in a stream that leaks through the streambed and collects on the water table, based on an assigned streambed leakage rate at each Regional Model stream node.
3. Calculate the monthly volume of water in a stream that does not infiltrate because of gaining stream conditions (i.e., rejected stream leakage). Rejected stream leakage remains as surface water as it passes the mouth of the stream and flows into the next stream system. For the Santa Clara River, rejected stream leakage eventually exits the Regional Model area at the west end of the valley, at the County Line stream gage.

Flow volumes in streams and rates of infiltration to groundwater from all water sources vary both geographically and over time based on sets of rules programmed into the SWRM. One of the most significant rules in the SWRM is that the infiltration rates to groundwater are not allowed to exceed the total amount of water generated by all surface water sources in a given month. The magnitude of each potential source of groundwater recharge is based on local hydrologic measurements that have been recorded over time.

Following are discussions of the data and methods that were used to estimate the source water volumes and the amount of infiltration from each of these sources.

C.4 Infiltration of Applied Water (Urban Use, Excluding Golf Courses)

A significant portion of water that is used outdoors goes to plant uptake and direct evaporation, and a smaller portion infiltrates to the underlying aquifer system. The magnitude of infiltration was estimated using recent water use and land use data (Figure C-2) for developed areas within the Santa Clarita Valley.

The average annual water demand provided by the Upper Basin Water Purveyors was approximately 49,000 acre-feet per year (AF/yr) from 1994 through 1998. On a long-term basis, outdoor water use in urbanized areas is approximately 66 percent of the total annual water demand, as indicated by records of total water demands and WRP flows (see Table C-1). Within urbanized areas that are industrial and retail land uses, the outdoor water use is estimated to be approximately 30 percent of the total water use. For all urbanized areas excluding golf courses, it was assumed that 10 percent of the applied water in areas of urban development could potentially recharge groundwater. This assumption means that a total of 90 percent of the applied water goes to evapotranspiration (ET) demands, surface runoff, and return flow to surface water.

Aerial photographs of the valley taken in 1999 were used to identify land uses in developed areas, and a geographic information system (GIS) was used to determine the acreage of each land use type. Table C-2 summarizes the derivation of estimated values of infiltration for urban irrigation water from land use and water use data. The table shows the average annual water use volumes, the land use acreage, and the calculated depths of annual infiltration to groundwater. As shown in the table, infiltration of urban irrigation water is estimated to be approximately 1 inch per year (in/yr) for retail and industrial land uses, and 2.2 in/yr for suburban residential land use and recreational land use (parks). These values were used as direct specified input to the SWRM and were not varied during calibration of the Regional Model.

An attempt was made to vary over time, the locations at which urban applied water was specified in the Regional Model. However, electronic records of historical land use data were unavailable. Consequently, to ensure that the total infiltration volume in urbanized areas reflected the increase in development and water use that occurred throughout the 1980s and 1990s, this infiltration was applied to the 1999 urbanized area, but at rates that were adjusted upward or downward in a given year according to the difference between water uses in that year and in 1999. Tables C-3 and C-4 show the actual rates that were applied to the 1999 urbanized area to account for the gradual increase in water use from 1980 through 1999.

C.5 Infiltration of Applied Water (Golf Course Irrigation)

From 1994 through 1998, the average annual water use for golf course irrigation was approximately 500 AF/yr. The majority of this water use was for irrigation and was specified in the SWRM as 100 percent of the total water use for the golf course.

The amount of return flow to groundwater resulting from golf course irrigation was estimated to be 30 percent of applied water, which is three times higher than the assumed rate for other urbanized areas. This estimate was based on information suggesting that golf courses irrigate beyond the water demand requirements of grassy areas to maintain the quality of the greens. As shown in Table C-2, this resulted in an estimated annual average infiltration rate of 4.6 in/yr. As with urban irrigation, the golf course irrigation was increased gradually from 1980 through 1999 to account for the increased population growth and urban water use in the urbanized Santa Clarita Valley (see Table C-5).

C.6 Infiltration of Applied Water (Agricultural)

Aerial photographs of the valley taken in 1999 indicate that approximately 877 acres are currently irrigated for agricultural uses in the model study area. Approximately 90 percent of these irrigated lands are underlain by the Alluvial Aquifer, while the remaining 10 percent lie on the terrace deposits or in areas where the Saugus Formation is exposed at the ground surface. The total area of irrigated agriculture has diminished substantially since the 1960s as a result of development in the area.

Agricultural land in the Santa Clarita Valley is used primarily to grow row crops. A review was performed of detailed records of agricultural pumping, crop types, the acreage of each crop type, and the water use requirements for each crop type (as listed in the California Irrigation Management Information System). This review was performed for the period 1996 through 2000 to estimate the amount of applied irrigation water that infiltrates to groundwater beneath irrigated agricultural lands. Figure C-3 shows the analysis, which compares crop water use requirements with applied water volumes and identifies the difference as being equal to the infiltration volume to groundwater. For the period 1996 through 2000, Figure C-3 shows the following:

a. The average applied water volume was 7,038 AF/yr

b. The average amount of water that was not consumptively used (and which therefore infiltrated to groundwater) was 2,583 AF/yr, which is approximately 37 percent of the applied water volume

c. The equivalent average infiltration rate over the 877-acre area was 2.9 AF/acre/yr (which is equivalent to 2.9 ft/yr)

The infiltration rate of 2.9 ft/yr corresponds to the 7,038 AF/yr average water use during 1996 through 2000. A higher infiltration rate would be expected during years of higher water use and lower rate during years of reduced water use. Table C-6 shows the corresponding infiltration rates for each year, based on the water use each year. The 500-foot spacing of the Regional Model grid resulted in slight over-estimation of the acreage within the model (1,205 acres) compared with the actual irrigated acreage (877 acres). This adjustment is also shown in Table C-6.

C.7 Infiltration of Direct Precipitation

As water falls onto the land surface or onto a body of water, it follows the three following natural pathways:

1. **Evapotranspiration.** This is the process by which water passes from a liquid to a vapor state via direct evaporation and through transpiration by plants (crops, urban landscaping, and native vegetation).
2. **Surface water runoff.** This represents water occurring as overland flow or water flowing in a stream.
3. **Infiltration.** This is the process by which water moves from the land surface downward through the upper soil layers. The process of infiltration increases the soil moisture content. If the soil moisture content reaches its field capacity, then any additional infiltration that takes place displaces water in the vadose zone and collects on the water table as groundwater recharge (deep percolation of precipitation). For the sake of clarity, references to infiltration in the rest of Appendix C will be synonymous with deep percolation of precipitation.

To estimate the infiltration rate, an understanding of the spatial pattern of precipitation must first be developed. To estimate the total volume of precipitation that falls onto the watershed, one would ideally like to have long-term precipitation data from several active rain gages located on a fairly consistent spacing throughout the watershed. However, due to the expense and maintenance required to operate a rain gage, such an extensive network of rain gages within a single watershed is typically not available for an extended period in most watersheds, as is the case for the Santa Clarita Valley.

C.7.1 Precipitation Data

The SWRM used precipitation data from the rain gage at the Newhall County Water District (NCWD) office, which is located south of Newhall Creek, approximately 1.3 miles south of the Newhall-Soledad rain gage (Figure C-4). Table C-7 lists the monthly precipitation at the NCWD gage from 1980 through 1999.

Because data from a single rain gage is not ideal for estimating the total volume of precipitation that falls within the entire watershed area, an isohyet map of California was also used. Figure C-4 shows contours of long-term average annual rainfall (isohyets) based on data compiled by the U.S. Geological Survey (USGS), the California Department of Water Resources, the California Geologic Survey (formerly the California Division of Mines and Geology), and where available, county and/or other local agencies. The source maps that were used to create the isohyet map are based primarily on U.S. Weather Service data from approximately 800 precipitation stations statewide. The U.S. Weather Service data were supplemented with county and local agency precipitation data in the Los Angeles area. The precipitation data were collected by these agencies over a sixty-year period from 1900 to

1960. Further information on the source of the isohyet data is available at the California Spatial Information Library.[1]

Because these isohyet data represent long-term hydrologic conditions from 1900 to 1960, a methodology was developed to estimate monthly precipitation throughout the Upper Santa Clara River Hydrologic Area using the NCWD gage data and the isohyets. For each month during the 1980 through 1999 Regional Model calibration period, this was done both within the Regional Model area and in the portions of the watershed lying outside the Regional Model area. The long-term average annual precipitation distribution shown in Figure C-4 was electronically draped over the nodes that comprise the Regional Model grid using the ESRI® ArcMap™/ArcInfo™ 8.3 GIS software. The annual precipitation rates at the NCWD rain gage from 1980 through 1999 were computed and compared with the value presented on the 1900 to 1960 isohyet map at that same location. The percent difference between the annual precipitation value and the isohyet value was computed for the NCWD rain gage location and applied to all isohyet values assigned to the Regional Model nodes, to estimate the average spatial distribution of precipitation for that particular calendar year. For example, the 1900-1960 isohyet value at the NCWD rain gage was 20.50 inches, but the 1980 annual precipitation data indicate 31.95 inches fell that year. Therefore, the adjustment factor for the isohyet values at all Regional Model nodes for 1980 was 31.95 divided by 20.50 or 1.559. This adjustment factor was then multiplied by the isohyet values at all Regional Model node locations to estimate the spatial distribution of annual precipitation during 1980.

The derivation of infiltration rates from direct precipitation within the Regional Model boundary is described in Section C.7.2. The derivation of streamflow rates from precipitation occurring outside the regional model boundary is discussed in Section C.8.1.

C.7.2 Infiltration Within the Regional Model Area

Because the Regional Model is a groundwater flow model, it does not directly input precipitation data. Instead, the monthly component of infiltration is estimated by the SWRM and used as input for the Regional Model. The infiltration rate is computed by the SWRM, within the Regional Model area, as described in the following paragraphs.

Annual precipitation infiltration volumes within the Regional Model domain were estimated from annual precipitation data using a variation of the Turner (1986) method. Turner empirically derived a power-function equation that described the relationship between annual rainfall and ET rates, based on the measured yields from 68 different watersheds located throughout California. Rainfall that does not go to ET is available for surface water runoff and infiltration to groundwater. During the largest storm events, some of this water leaves the basin before it has a chance to infiltrate to groundwater. However, during all but the largest storm events, precipitation that is not consumed by ET eventually infiltrates to groundwater, as defined by the following equation (Turner, 1986):

$$\text{Infiltration} + \text{Runoff} = \text{Precipitation} - 2.32(\text{Precipitation})^{0.66} \qquad \text{(C-1)}$$

[1] http://gis.ca.gov/meta.epl?oid=286

Equation C-1 is plotted on Figure C-5 for a range of annual precipitation values expressed in units of inches. Because this expression was empirically derived based on a best-fit to data from 68 watersheds throughout California, it is not necessarily representative of the conditions in an individual watershed. Therefore, the two power-function coefficients were adjusted during the process of calibrating the Regional Model. A final set of power-function coefficients for the Regional Model produced the following relationship for the Santa Clarita Valley:

$$\text{Infiltration} + \text{Runoff} = \text{Precipitation} - 6.20(\text{Precipitation})^{0.33} \qquad \text{(C-2)}$$

Equation C-2 (Figure C-5) was then applied to the annual precipitation-adjusted isohyet values to estimate the annual rate of infiltration from 1980 through 1999. Finally, based on the percentage of annual precipitation that fell each month during that calendar year at the NCWD rain gage, the annual infiltration rates were converted into monthly rates for every node in the Regional Model.

C.8 Infiltration From Streams

The natural sources of water to streams within the Santa Clarita Valley are surface water runoff from portions of the Upper Santa Clara River Hydrologic Area watershed that lie outside of the Regional Model boundary, and flow in the Santa Clara River where it enters the valley. Additionally, DWR releases water into Castaic Creek from Castaic Lagoon in some years, and treated water is discharged into the river from two WRPs on a continual basis. Following are discussions of the volumes of these water sources and the method used to determine infiltration rates in stream beds, based on the magnitude of flow in each stream.

C.8.1 Surface Water Runoff Volume Outside the Regional Model Area

For the Regional Model to honor the water budget for the entire watershed, a method was developed to estimate the monthly availability of surface water runoff and subsurface inflow from areas that are tributary to the Regional Model boundary. To do this, GIS software was used to provide specific input data to the SWRM as follows:

a. First, GIS software was used to delineate the extents of selected subwatersheds within the Upper Santa Clara River Hydrologic Area, using 30-meter digital elevation model data obtained from the USGS. Figure C-6 depicts the extents of these subwatersheds. The extents of the subwatersheds were important to delineate because precipitation rates vary spatially (see Figure C-4); therefore, at any given time, each sub-watershed receives different magnitudes of precipitation, and yields different quantities of surface water runoff and subsurface inflow into the Regional Model area.

b. Once the selected subwatersheds were delineated, the spatial areas were computed by GIS software for the entire subwatershed and for the portion of the subwatershed lying outside the Regional Model boundary. The GIS software also computed the mean of the 1900 to 1960 precipitation (isohyet) distribution within each subwatershed. The areas and the 1900 to 1960 mean precipitation values for each subwatershed are listed in Table C-8. The means of the 1900-1960 precipitation data were then multiplied by the precipitation adjustment factor (discussed in Section C.7.1) for each calendar year to estimate the average magnitude of precipitation that fell within each sub-watershed during that calendar year.

c. Equation C-2 was then applied to the adjusted annual precipitation values for each sub-watershed to estimate the annual rate of surface water runoff from 1980 through 1999. This provided an estimate of the annual volume of water from subwatersheds that is then available as potential groundwater recharge within the stream reach that lies within the Regional Model domain. These annual estimates were then converted to monthly estimates by multiplying by the monthly percentage of precipitation that fell at the Newhall County Water District rain gage.

C.8.2 Santa Clara River Streamflow at Eastern Regional Model Boundary

The eastern point of the Regional Model, the location at which the Santa Clara River enters the model area, marks the approximate location of the Lang gage (Figure C-6). Streamflow was measured at this gage by the USGS and Los Angeles County for a discontinuous period of 36 years starting in 1949. The gaging station was removed from service in October 1989. Because the Santa Clara River flow into the model domain is a critical boundary condition for the Regional Model, it was necessary to estimate this streamflow beginning in October 1989.

The following paragraphs describe the method used to estimate the monthly streamflow at the Lang gage. This process used the Lang gage data through September 1989 and monthly precipitation data from a rain gage in the Acton groundwater basin, which is immediately east and upgradient of the Regional Model area. Using a multiple linear regression method described below, a good correlation between monthly precipitation data from the U.S Forest Service's Acton rain gage and the Lang stream gage was achieved. The resulting regression equation was used to generate estimates of streamflow during the period that streamflow data were unavailable (October 1989 through December 1999).

C.8.2.1 Data Sources

Monthly precipitation data for 1949 to 2001 were obtained for the Acton, California rain gage maintained by the U.S. Forest Service from the Western Regional Climate Data Center. This gage was determined to be the closest rain gage to the center of the Acton watershed with a long enough period of record to complete the regression analysis. Average rainfall at the Acton rain gage was 10.3 inches during the period of record, which is approximately 58 percent of the 17.83-inch average measured from 1883 through 2000 at the Newhall-Soledad gage.

C.8.2.2 Streamflow Estimation Method

The streamflow estimation procedure for the Lang gage site assumed that a predictable relationship exists between streamflows at the Lang gage and precipitation at the Acton rain gage. This assumption was used to develop a multiple linear regression relationship and to test the quality of that relationship using historical data. A simple mathematical model was established in which the streamflow at the Lang gage during a given month was estimated from the precipitation during the prior month. A Microsoft® Excel spreadsheet was used to perform the multiple linear regression calculations and to determine the regression coefficients for each monthly rainfall value.

The regression model was calibrated using monthly streamflow data for the Lang gage during water years 1949 to 1956. The calibration was verified using streamflow and precipitation data for water years 1957 to 1989. Numerous iterations using different rainfall periods and durations were attempted before achieving a good correlation. The final regression model bases the streamflow estimates on the previous six monthly rainfall values to predict each monthly streamflow value at the Lang gage.

The final regression equation was of the form:

$$\text{Streamflow at the Lang gage} = C1^{*}\text{Rain}_{\text{month1}} + C2^{*}\text{Rain}_{\text{month2}} + \ldots + C6^{*}\text{Rain}_{\text{month6}} \quad \text{(C-3)}$$

where C1, C2, …C6 are the regression constants.

C.8.2.3 Accuracy of Streamflow Estimates

Once a regression equation is developed and its predictions are verified, streamflows are commonly estimated by applying the equation to any set of precipitation data that are similar in magnitude to those which were used to develop the regression relationship (in this case, the historic values at the Acton rain gage). To verify that the regression equations produced accurate streamflow predictions, streamflow rates calculated from the regression equations were plotted and compared against measured streamflow rates for the period of record at the Lang gage. Figure C-7 shows a comparison plot using the results of this analysis, along with the final regression equation. The plotted data indicate that the regression equation produced streamflow estimates that closely matched measured streamflows. Where differences are apparent between computed and measured streamflows, this results from one or more of the following influences:

a. **System Operation.** The effects of streamflow diversions, pump stations, and wet weather bypasses are not consistent from storm to storm, and can result in irregular streamflows under similar precipitation events.

b. **Rainfall Distribution.** The regression equations were generated from the rain gage that was thought to best represent the precipitation distributed over the entire Acton basin. However, variability of rainfall volume and intensity is normal across basins, resulting in differences in streamflow volume and timing.

c. **Gage Data.** It is common to have intermittent problems with streamflow measurement devices, particularly because of changes in the depth-versus-streamflow relationship at the gaging station over time. The regression equation was produced from storm events during periods where the Acton precipitation data appeared to be the most reliable. These data are reasonable and appropriate for the uses of this study.

d. **Antecedent Conditions.** Streamflow predicted by the regression equation will be most accurate when applied to periods when storm intensity, duration, and antecedent conditions are similar to those used to generate the regression equations. If the antecedent conditions differ significantly from those present in the historical record, then the ability to forecast streamflow characteristics may be hindered.

As Figure C-7 shows, the relationship between monthly precipitation at the Acton rain gage and streamflow at the Lang gage is fairly predictable and has been consistent over time. This mathematical relationship would be expected to remain consistent unless significant changes occur within the basin to affect streamflows, such as major land use changes.

The Acton rain gage was removed from service at the end of August 2000, therefore streamflow predictions cannot be made beyond this date using the calibrated regression model parameters described above. Table C-9 lists the combined set of measured and computed monthly streamflow values for the Lang gage from 1980 through 1999.

The monthly availability of streamflows at the Lang gage were input into the SWRM and allowed to infiltrate based on the specified maximum stream leakage rate, as Section C.8.5 of this appendix will discuss.

C.8.3 Releases from Castaic Lake

As described in Section 2.6.3.4 in the main body of this report, Castaic Creek occasionally receives surface water releases from Castaic Lagoon (i.e., Castaic Lake). The SWRM treats this surface water as it would any other available surface water in a stream. Based on the volume of available water during each monthly stress period, that water is allowed to infiltrate the Castaic Creek streambed and recharge the underlying groundwater system at a rate equal to or less than the streambed infiltration capacity (see Section C.8.5). Table C-10 lists the monthly releases of state surface water into Castaic Creek.

C.8.4 Treated Wastewater

Another anthropogenic source of recharge to the groundwater system is treated wastewater from the two LACSD WRPs in the valley, Plant No. 32 near Valencia, known as the Valencia WRP, and Plant No. 26 near Bouquet Canyon known, as the Saugus WRP. Tables C-11 and C-12 list the monthly volumes of treated wastewater that are discharged to the Santa Clara River from the Valencia WRP and the Saugus WRP, respectively.

The SWRM treats this surface water component as it would any other available surface water in a simulated stream. The volume of available treated wastewater during each monthly stress period is simulated to infiltrate the Santa Clara River streambed and recharge the groundwater system at a rate equal to or less than the streambed infiltration capacity (see Section C.8.5).

C.8.5 Assignment of Stream Leakage

Once the monthly streamflows were established for the Santa Clara River and each of its selected tributaries, a method had to be developed to determine the rates and locations of surface water infiltration to the underlying Alluvial Aquifer system. The following paragraphs describe this method.

C.8.5.1 Stream Connectivity and Ranking System

For the SWRM to assign stream leakage rates accurately, a stream ranking convention was adopted (Figure C-8) as follows:

1. Santa Clara River
2. All modeled streams that merge with the Santa Clara River (2nd order streams)

3. All modeled streams that merge with the 2nd order streams (3rd order streams)
4. All modeled streams that merge with the 3rd order streams (4th order streams)
5. All modeled streams that merge with the 4th order streams (5th order streams)

For the entire model domain, the SWRM processes the assignment of stream leakage beginning with the highest ranking stream nodes and progressing sequentially downstream to the lowest ranking stream nodes for each subwatershed. This ensures a correct accounting of available stream leakage throughout the stream network in the Regional Model domain. Within a given stream, the connectivity relationships between each Regional Model grid node in that stream were established by ordering the Regional Model stream node number from upgradient nodes to downgradient nodes (Figure C-8). Additionally, the last stream node of a given stream was assigned a "next node number," which indicated the nearest node for the next downstream (lower ranking) stream that could receive any surface flows that remained in the higher ranking stream. This "next node number" attribute allowed the SWRM to simulate continued surface water infiltration in the lower ranking streams as long as the total volume of available recharge water was not consumed in upstream reaches of the simulated stream.

C.8.5.2 Stream Geometry at Each Node

Another necessary input for specifying infiltration rates from streams was the geometry of each individual stream node, specifically, the length, width, and area of each stream node (Figure C-8). This was required because the groundwater recharge module that was used within the Regional Model requires input in units of feet per day, then internally computes the volumetric groundwater recharge rate (in cubic feet per day) using the nodal area (in square feet). Thus, the SWRM requires input of simulated stream geometry assumptions to ensure that the correct volume of water is being recharged through the simulated streambeds.

C.8.5.3 Streambed Infiltration Capacity at Each Node

The streambed infiltration capacity was specified at each stream node in the SWRM. The streambed infiltration capacity is the maximum volume of water that can infiltrate through streambed sediments, assuming a sufficient volume of water in the stream. The streambed infiltration capacity is measured in cubic feet per second per stream mile and is a function of streambed sediment permeability and wetted width of the stream at any given time.

The wetted width of a stream at any given time will vary as a function of the amount of flow in the stream and will be less than the nodal width for all but the highest streamflows. Additionally, permeability of the streambed sediments will vary spatially and can even vary over time at any given location because of the scouring and deposition that occur during high flow events. Consequently, the streambed infiltration capacity of a stream at any given location can vary over time. For this reason, and because stream widths can vary in the field but not in the Regional Model, streambed infiltration capacity was allowed to vary over time in the SWRM.

A post-processor was written into the SWRM code to aid in the selection of time-varying streambed infiltration rates. The post-processor became a part of the calibration process of the Regional Model, in that differences between measured and simulated groundwater elevations were used to help determine whether the streambed infiltration capacity of a given stream reach needed to be raised or lowered during any given month. Because this process required groundwater elevation data in the underlying groundwater system (in this case, the Alluvial Aquifer), the post-processor could only be applied along the Santa Clara River and Castaic Creek. Few, if any, records of groundwater elevations exist for the Alluvial Aquifer along the other streams, so streambed infiltration capacities were not varied over time along those streams. A complete description of the Regional Model calibration process and results can be found in Sections 4 and 5 in the main body of this report.

The monthly adjustment of the assumed streambed infiltration capacities during calibration of the Regional Model was performed in an iterative manner, using the following steps (which are also shown in Figure C-9):

1. Initial estimates of the maximum stream leakage rate were specified in the SWRM, which then generated monthly sets of groundwater recharge rates at each Regional Model node along the Santa Clara River and Castaic Creek during the 20-year simulation period.

2. The Regional Model was then run, and simulated groundwater elevations were recorded over time at selected calibration well locations along the Santa Clara River and Castaic Creek.

3. Simulated groundwater elevations were compared with measured elevations at each calibration well, and the differences (head residuals) were used to compute the surplus or deficit of water calculated by the Regional Model. For example, if a set of calibration wells in a particular area along the Santa Clara River indicated that simulated groundwater levels were 10 feet too high during a monthly stress period, then the computation would proceed as follows:

    a. Multiply the head residuals by the specific yield and the adjacent stream node area in the stream reach where the calibration well is located, to obtain the volume of surplus recharge water in the model.

    b. Reduce the assumed maximum stream leakage rate so that the calculated surplus recharge volume of water would not infiltrate in the stream reach associated with the calibration well during that particular monthly stress period. In other words, at a location where the model simulates too much stream leakage, the post-processor computes the volume of surplus recharge that, if eliminated, would allow the simulated groundwater elevations to better match the measured groundwater elevations. In this example, streamflow would be infiltrating the simulated streambed at a slower rate, thereby persisting as streamflow for a longer downstream reach of the stream channel.

4. Using the new values of streambed infiltration capacity, the SWRM was then run again to provide new groundwater recharge rates each month at the nodes where the post-processor was applied. The Regional Model was then run again with the new groundwater recharge rates, and this entire process was repeated until the assumed maximum stream leakage rate and/or the simulated groundwater elevations showed little to no change from one simulation to the next.

The streambed infiltration capacity that is assigned by the SWRM for each month is not necessarily the rate that surface water leaks into the Regional Model at any given location. The specified infiltration capacity simply allows stream leakage to occur as long as streamflows are available. For example, if the selected calibration wells are simulating groundwater elevations too low in comparison with measured groundwater elevations during a drought period, then the post-processor function within the SWRM would try to increase the assumed maximum stream leakage rate. However, during a drought, the availability of surface water is diminished. Therefore, even though the SWRM might increase the streambed infiltration capacity, there would be reaches where streamflows would be too low to allow water to infiltrate at a rate as high as the streambed infiltration capacity. The SWRM can only infiltrate the surface water if it is available, based on the complete water balance within the watershed. This rule allows the SWRM and the Regional Model to honor the watershed water budget.

C.9 Rejected Stream Leakage

As previously mentioned, the SWRM also tracks the volume of surface water in each simulated stream that does not infiltrate during each monthly stress period because of gaining stream conditions (i.e., rejected stream leakage). This rejected stream leakage remains as surface water in the Santa Clara River and eventually exits the Regional Model at the west end of the valley at the County Line stream gage. The monthly volumes of rejected stream leakage (calculated by the SWRM) and groundwater discharges to the river (calculated by the Regional Model) were used during the calibration process to compare these combined flow rates with streamflows measured at the County Line stream gage. This is discussed in detail in Sections 4.4.2 and 5.2.3 of the report.

Table C-13 lists the monthly streamflow measured from 1980 through 1999 at the County Line gage, which is located on the Santa Clara River at the western (downstream) end of the Santa Clarita Valley. Until October 1996, this gage was located just downstream of the Los Angeles-Ventura County line and just upstream of Blue Cut.[2] This gage continued operation through October 21, 1996, at which time it was permanently taken out of service. A new gage (USGS Gage No. 11109000) was put into service beginning on October 1, 1996 approximately 2.5 miles downstream, near Piru Junction, at the Las Brisas Bridge.

[2] Blue Cut is an area where the valley becomes substantially narrower in width and the river begins to bend toward the southern side of the valley. See Figure C-1 for this location.

C.10 References

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Tables

Table C-1
Comparison of WRP Discharges with Urban Water Demands
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	WRP Discharges to the Santa Clara River (AF/yr)	Urban Water Demands (AF/yr)	Percentage of Urban Demand Used Indoors (Routed to WRPs)	Percentage of Urban Demand Used Outdoors
1980	7,374	22,319	33.0	67.0
1981	7,950	24,822	32.0	68.0
1982	8,438	21,912	38.5	61.5
1983	9,422	21,386	44.1	55.9
1984	9,514	27,386	34.7	65.3
1985	9,616	28,482	33.8	66.2
1986	6,020	31,152	19.3	80.7
1987	11,843	33,877	35.0	65.0
1988	12,363	37,634	32.9	67.1
1989	13,560	42,813	31.7	68.3
1990	14,006	43,066	32.5	67.5
1991	14,108	39,793	35.5	64.5
1992	15,702	41,266	38.1	61.9
1993	17,178	43,352	39.6	60.4
1994	16,946	45,988	36.8	63.2
1995	17,823	45,673	39.0	61.0
1996	16,827	50,147	33.6	66.4
1997	15,775	54,173	29.1	70.9
1998	17,691	48,858	36.2	63.8
1999	17,847	57,250	31.2	68.8
1999	17,847	57,250	31.2	68.8
Statistics for 1980 through 1999				
Minimum	**6,020**	**21,386**	**19.3**	**55.9**
Maximum	**17,847**	**57,250**	**44.1**	**80.7**
Average	**13,231**	**38,981**	**34.2**	**65.8**
Median	**14,006**	**41,266**	**33.8**	**66.2**
Statistics for 1980 through 1999, Excluding 1986				
Minimum	**7,374**	**21,386**	**29.1**	**55.9**
Maximum	**17,847**	**57,250**	**44.1**	**70.9**
Average	**13,592**	**39,372**	**34.9**	**65.1**
Median	**14,057**	**42,040**	**34.3**	**65.7**

TABLE C-2
Calculation of Outdoor Irrigation Infiltration Rates to Groundwater for Non-Agricultural Water Uses
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Term	Value	Units	Reference or Calculation Method	Comment
NCWD Annual Water Use, 5-Year Average 1994 through 1998	8,150	AF/yr	Table III-6 in *1999 Annual Basin Report* (Luhdorff and Scalmanini Consulting Engineers, 2000)	16 percent of retailer-supplied water.
SCWD Annual Water Use, 5-Year Average 1994 through 1998	20,920	AF/yr		42 percent of retailer-supplied water.
VWC Total Annual Use, 5-Year Average 1994 through 1998	19,330	AF/yr		40 percent of retailer-supplied water.
LA County 36 Annual Water Use, 5-Year Average 1994 through 1998	570	AF/yr		1 percent of retailer-supplied water.
Valencia Country Club (VCC) Annual Water Use, 5-Year Average 1994 through 1998	490	AF/yr		1 percent of retailer-supplied water.
Annual Water Use, 5-Year Average 1994 through 1998	**49,460**	**AF/yr**		
Area of Water Use (excluding agriculture and undeveloped)	17,691	acres	Aerial photography (1999).	Area where retailer-supplied water is used.
Alluvial Aquifer Area of Water Use (excluding agriculture and undeveloped)	8,000	acres		Alluvial area where retailer-supplied water is used.
Saugus Area of Water Use (excluding agriculture and undeveloped)	9,691	acres		Saugus area where retailer-supplied water is used.
Alluvial Aquifer Lands – Suburban Residential Area	4,765	acres	Aerial photography (1999) and geologic mapping.	60 percent of alluvium area receiving applied water.
Alluvial Aquifer Lands – Retail – Office – Industrial Area	2,900	acres		36 percent of alluvium area receiving applied water.
Alluvial Aquifer Lands – Recreational Area	0	acres		No recreational areas were identified as overlying alluvium.
Alluvial Aquifer Lands – Golf Course Area	335	acres		4 percent of alluvium area receiving applied water.
Saugus Lands – Suburban Residential Area	8,192	acres		85 percent of Saugus area receiving applied water.
Saugus Lands – Retail - Office – Industrial Area	1,411	acres		15 percent of Saugus area receiving applied water.
Saugus Lands – Recreational Area	46	acres		Less than 1 percent of Saugus area receiving applied water.
Saugus Lands -- Golf Course Area	42	acres		Less than 1 percent of Saugus area receiving applied water.
Percent Annual Water Consumption for Outdoor Use -- Suburban Residential	65		Comparison of historical water use records and WRP flow records. See Table C-1.	
Percent Annual Water Consumption for Outdoor Use -- Retail/Office/Industrial	30			
Percent Annual Water Consumption for Outdoor Use – Recreational	65			
Percent Annual Water Consumption for Outdoor Use -- Golf Course	100			
Percent Applied Water Going to Deep Percolation -- Suburban Residential	10		Assumed irrigation efficiency is 10 percent for all urban land uses where irrigation occurs.	
Percent Applied Water Going to Deep Percolation -- Retail/Office/Industrial	10			
Percent Applied Water Going to Deep Percolation -- Recreational	10			
Percent Applied Water Going to Deep Percolation -- Golf Course	30			
Percent Total Water Use Going to Deep Percolation -- Suburban Residential	6.5		Calculated.	Equals 65 percent times 10 percent.
Percent Total Water Use Going to Deep Percolation -- Retail/Office/Industrial	3.0			Equals 30 percent times 10 percent.
Percent Total Water Use Going to Deep Percolation -- Recreational	6.5			Equals 65 percent times 10 percent
Percent Total Water Use Going to Deep Percolation -- Golf Course	30.0			Equals 100 percent times 30 percent.
Alluvial Aquifer Annual Deep Percolation – Suburban Residential	866	AF/yr	Calculated from total water use (49,460 AF/yr), the area overlying the alluvium for each land use category, and the percentage of total water use going to recharge.	Equals 49,460 AF/yr * (4765 acres / 17691 acres) * 6.5 percent.
Alluvial Aquifer Annual Deep Percolation -- Retail/Office/Industrial	243	AF/yr		Equals 49,460 AF/yr * (2900 acres / 17691 acres) * 3.0 percent.
Alluvial Aquifer Annual Deep Percolation – Recreational	0	AF/yr		No recreational areas overlie alluvium.
Alluvium Annual Deep Percolation -- Golf Course	130	AF/yr		Equals 490 AF/yr * (335 acres / (335+42 acres)) * 30.0 percent.
Alluvial Aquifer Annual Deep Percolation	**1,239**	**AF/yr**		
Alluvial Aquifer 5-Year Deep Percolation (1994 through 1998)	**6,195**	**AF**		
Saugus Annual Deep Percolation – Suburban Residential	1,489	AF/yr	Calculated from total water use (49,460 AF/yr), the area overlying the Saugus for each land use category, and the percentage of total water use going to recharge.	Equals 49,460 AF/yr * (8192 acres / 17691 acres) * 6.5 percent.
Saugus Annual Deep Percolation – Retail/Office/Industrial	118	AF/yr		Equals 49,460 AF/yr * (1411 acres / 17691 acres) * 3.0 percent.
Saugus Annual Deep Percolation – Recreational	8	AF/yr		Equals 49,460 AF/yr * (46 acres / 17691 acres) * 6.5 percent.
Saugus Annual Deep Percolation – Golf Course	16	AF/yr		Equals 490 AF/yr * (42 acres / (335+42 acres) * 30.0 percent.
Saugus Annual Deep Percolation	**1,631**	**AF/yr**		
Saugus 5-Year Deep Percolation (1994 through 1998)	**8,155**	**AF**		
Average Area-Wide Deep Percolation -- Suburban Residential	2.2	in/yr	Calculated from applied water volumes in Alluvial and Saugus samples, as well as combined area in alluvium and Saugus occupied by each land use category.	Equals (12 in/ft)* (866+1,489 AF/yr) / (4,765+8,192 acres).
Average Area-Wide Deep Percolation -- Retail/Office/Industrial	1.0	in/yr		Equals (12 in/ft)* (243+118 AF/yr) / (2,900+1411 acres).
Average Area-Wide Deep Percolation -- Recreational	2.2	in/yr		Equals (12 in/ft)* (0+8 AF/yr) / (0+46 acres).
Average Area-Wide Deep Percolation -- Golf Course	4.6	in/yr		Equals (12 in/ft)* (130+16 AF/yr) / (335+42 acres).

Notes:

Applied water recharge to Saugus includes areas where terrace deposits are present at the ground surface.
in/ft = inches per foot

Table C-3
Irrigation Infiltration Rates over 1999 Suburban Residential Area
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Year	Total Water Use (AF/yr)	Eq. Infiltration over 1999 Suburban Residential Area (in/yr)	Ratio Compared with 1999
1980	22,319	0.86	0.391
1981	24,822	0.95	0.432
1982	21,912	0.84	0.382
1983	21,386	0.82	0.373
1984	27,386	1.05	0.477
1985	28,482	1.09	0.495
1986	31,152	1.2	0.545
1987	33,877	1.3	0.591
1988	37,634	1.45	0.659
1989	42,813	1.65	0.75
1990	43,066	1.65	0.75
1991	39,793	1.53	0.695
1992	41,266	1.59	0.723
1993	43,352	1.67	0.759
1994	45,988	1.77	0.805
1995	45,673	1.76	0.8
1996	50,147	1.93	0.877
1997	54,173	2.08	0.945
1998	48,858	1.88	0.855
1999	57,250	2.2	1
2000	60,988	2.34	1.064

Note:

Eq. = equivalent

Table C-4
Irrigation Infiltration Rates over 1999 Retail and Industrial Area
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Year	Total Water Use (AF/yr)	Eq. Infiltration over 1999 Retail/Industrial Area (in/yr)	Ratio Compared with 1999
1980	22,319	0.39	0.39
1981	24,822	0.43	0.43
1982	21,912	0.38	0.38
1983	21,386	0.37	0.37
1984	27,386	0.48	0.48
1985	28,482	0.5	0.5
1986	31,152	0.54	0.54
1987	33,877	0.59	0.59
1988	37,634	0.66	0.66
1989	42,813	0.75	0.75
1990	43,066	0.75	0.75
1991	39,793	0.7	0.7
1992	41,266	0.72	0.72
1993	43,352	0.76	0.76
1994	45,988	0.8	0.8
1995	45,673	0.8	0.8
1996	50,147	0.88	0.88
1997	54,173	0.95	0.95
1998	48,858	0.85	0.85
1999	57,250	1	1

Table C-5
Irrigation Infiltration Rates over 1999 Golf Course Areas
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Year	Total Water Use (AF/yr)	Eq. Infiltration over 1999 Golf Courses Area (in/yr)	Ratio Compared with 1999
1980	22,319	1.79	0.389
1981	24,822	1.99	0.433
1982	21,912	1.76	0.383
1983	21,386	1.72	0.374
1984	27,386	2.2	0.478
1985	28,482	2.29	0.498
1986	31,152	2.5	0.543
1987	33,877	2.72	0.591
1988	37,634	3.02	0.657
1989	42,813	3.44	0.748
1990	43,066	3.46	0.752
1991	39,793	3.2	0.696
1992	41,266	3.32	0.722
1993	43,352	3.48	0.757
1994	45,988	3.7	0.804
1995	45,673	3.67	0.798
1996	50,147	4.03	0.876
1997	54,173	4.35	0.946
1998	48,858	3.93	0.854
1999	57,250	4.6	1

Table C-6
Irrigation Infiltration Rates for Agricultural Lands
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Year	Agricultural Applied Water Volume (AF/yr)	Infiltration Rate (ft/yr)	Infiltration Rate for Modeled Acreage (ft/yr)	Percentage of 1996 through 2000 Average
1980	6,364	2.7	1.9	90
1981	7,433	3.1	2.2	106
1982	5,441	2.3	1.6	77
1983	4,487	1.9	1.3	64
1984	6,311	2.6	1.9	90
1985	5,241	2.2	1.5	74
1986	4,657	1.9	1.4	66
1987	3,662	1.5	1.1	52
1988	3,348	1.4	1.0	48
1989	3,511	1.5	1.0	50
1990	4,623	1.9	1.4	66
1991	3,958	1.7	1.2	56
1992	5,022	2.1	1.5	71
1993	4,508	1.9	1.3	64
1994	5,958	2.5	1.8	85
1995	6,276	2.6	1.8	89
1996	6,728	3.2	2.2	108
1997	7,528	3.0	2.1	102
1998	5,980	2.7	1.9	93
1999	7,479	2.9	2.1	99
2000	7,476	2.9	2.0	98
Average (1996 through 2000)	**7,038**	**2.9**	**2.1**	100

Note:
Actual acreage is 877 acres; modeled acreage is 1,205 acres.

TABLE C-7
Monthly Precipitation Measured at the Newhall County Water District Rain Gage
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1980	10.36	14.63	4.84	0.36	0.40	0.00	0.00	0.00	0.00	0.00	0.00	1.36	31.95
1981	4.76	1.66	5.50	0.46	0.00	0.00	0.00	0.00	0.00	0.58	3.62	0.22	16.80
1982	3.33	1.21	9.50	1.09	0.13	0.00	0.00	0.00	1.02	0.25	5.34	2.95	24.82
1983	8.67	6.85	13.07	4.61	0.20	0.00	0.00	1.17	1.85	1.74	5.04	5.13	48.33
1984	0.00	0.00	0.27	0.07	0.00	0.00	0.00	0.00	0.05	0.16	3.87	8.13	12.55
1985	0.78	1.20	1.04	0.14	0.07	0.00	0.06	0.00	0.12	0.54	5.11	0.70	9.76
1986	5.84	6.65	5.39	0.88	0.00	0.00	0.05	0.00	1.78	0.68	1.55	0.24	23.06
1987	2.10	0.61	1.69	0.14	0.00	0.00	0.09	0.02	0.00	3.47	3.84	4.80	16.76
1988	3.27	3.39	1.16	3.98	0.09	0.00	0.00	0.00	0.10	0.00	0.92	7.14	20.05
1989	0.89	4.13	1.30	0.30	0.00	0.00	0.00	0.00	0.62	0.86	0.37	0.00	8.47
1990	2.89	4.23	0.22	0.48	0.88	0.00	0.00	0.00	0.00	0.00	0.63	0.01	9.34
1991	1.11	5.72	11.33	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	5.95	24.61
1992	3.28	16.64	9.73	0.15	0.34	0.00	0.30	0.00	0.00	1.55	0.00	7.25	39.24
1993	17.11	11.73	4.27	0.00	0.00	0.65	0.00	0.00	0.00	0.57	0.75	1.00	36.08
1994	0.48	5.31	2.33	0.42	0.00	0.00	0.00	0.00	0.00	0.78	0.71	1.94	11.97
1995	21.98	1.93	8.30	0.72	0.26	0.76	0.00	0.00	0.00	0.00	0.00	2.33	36.28
1996	2.97	6.73	2.08	0.13	0.68	0.00	0.00	0.00	0.00	1.30	1.06	8.70	23.65
1997	6.67	0.23	0.00	0.00	0.00	0.00	0.05	0.00	0.53	0.00	3.73	6.72	17.93
1998	3.49	22.00	3.98	2.28	5.50	0.06	0.00	0.00	0.21	0.33	1.36	1.39	40.60
1999	2.08	0.65	3.00	3.78	0.00	0.48	0.00	0.00	0.01	0.00	0.00	0.05	10.05

Note:

All precipitation values are measured in inches.

TABLE C-8
Spatial Areas and Means of 1900 to 1960 Precipitation for Subwatersheds
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Canyon/Stream	Subwatershed Area (acres)	Contributing Area to Regional Model (acres)	Mean of Precipitation 1900 to 1960 within Each Contributing Area (in/yr)
Bee Canyon	1,163.38	970.06	11.41
Bouquet Canyon	11,995.90	9,100.66	14.09
Bouquet Canyon Tributary 1	409.84	291.36	12.81
Bouquet Canyon Tributary 2	683.75	577.67	13.25
Bouquet Canyon Tributary 3	459.20	393.53	13.18
Lower Castaic Creek	13,109.20	4,205.12	14.73
Upper Castaic Creek	98,417.60	98,417.60	19.62
Charlie Canyon	6,323.41	5,418.33	15.55
Dry Canyon	4,883.13	2,900.08	14.20
Gavin Canyon	3,608.62	2,913.39	21.32
Haskell Canyon	7,608.26	5,976.49	14.01
Hasley Canyon	5,609.59	385.96	14.25
Iron Canyon	1,734.63	1,401.94	18.92
Marple Canyon	6,031.13	4,980.94	17.09
Mint Canyon	5,711.30	4,155.07	12.45
Mint Canyon Tributary 1	615.56	367.82	12.14
Mint Canyon Tributary 2	1,697.89	1,438.90	12.22
Mint Canyon Tributary 3	304.45	296.87	12.61
Mint Canyon Tributary 4	234.88	231.90	12.93
Mint Canyon Tributary 5	118.01	114.80	13.01
Newhall Canyon	3,191.67	1,625.11	18.98
Oak Spring Canyon	3,628.60	2,721.91	16.21
Pico Canyon	4,404.42	2,853.93	19.47
Placerita Canyon	6,117.92	2,490.47	18.20
Plum Canyon	2,085.00	753.09	13.25
Pole Canyon	1,744.04	1,614.78	15.95
Potrero Canyon	2,865.18	1,074.76	15.88
Railroad Aqueduct Canyon	865.82	198.83	20.27

TABLE C-8
Spatial Areas and Means of 1900 to 1960 Precipitation for Subwatersheds
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Canyon/Stream	Subwatershed Area (acres)	Contributing Area to Regional Model (acres)	Mean of Precipitation 1900 to 1960 within Each Contributing Area (in/yr)
San Francisquito Canyon	31,388.60	26,878.10	16.51
San Martinez Canyon	2,117.60	1,384.49	13.67
Sand Canyon	5,489.51	4,191.58	19.39
Sand Canyon Road Tributary	554.03	508.56	13.12
Sand Canyon Tributary 1	644.26	251.41	15.97
Sand Canyon Tributary 2	338.66	221.79	16.99
Santa Clara River East	12,696.90	2,562.57	14.16
Santa Clara River West	17,105.90	3,169.86	13.76
Santa Clara River Tributary 1	1,278.18	927.13	16.97
Santa Clara River Tributary 2	277.82	264.96	13.64
Santa Clara River Tributary 3	219.50	189.19	13.65
Santa Clara River Tributary 4	101.25	91.84	13.54
Santa Clara River Tributary 5	114.80	106.31	13.44
South Fork Santa Clara River	5,491.11	655.74	17.62
Tapie Canyon	1,260.27	1,235.25	11.39
Texas Canyon	6,956.88	6,659.55	13.59
Tick Canyon	3,662.58	3,428.16	11.57
Tick Canyon Tributary	175.19	154.75	12.09
Towsley Canyon	3,681.64	3,606.56	21.43
Vasquer Canyon	2,743.26	2,151.81	12.66
Whitney Canyon	1,321.58	1,104.38	18.95
Area Totals	**293,241.89**	**217,615.36**	

TABLE C-9
Monthly Streamflows Measured in the Santa Clara River at the Lang Gage
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1980	1,310	7,449	1,213	568	218	78	6	0	37	274	467	553	12,175
1981	594	98	339	240	107	18	18	12	338	321	258	394	2,739
1982	333	1,420	785	283	238	0	0	0	0	95	178	855	4,188
1983	1,922	16,971	2,755	2,576	958	523	639	512	0	0	0	0	26,855
1984	0	596	405	240	143	166	228	411	154	220	904	578	4,044
1985	483	461	274	215	77	0	0	0	12	179	221	301	2,224
1986	483	1,138	488	283	107	6	0	12	6	12	80	129	2,744
1987	117	117	65	31	12	0	0	0	0	0	258	516	1,116
1988	222	209	506	117	77	68	0	0	0	0	12	25	1,236
1989	50	111	60	25	6	0	0	0	102	94	34	18	499
1990	212	276	230	46	46	5	0	0	0	27	36	147	1,025
1991	162	775	879	736	145	142	14	0	45	69	62	263	3,291
1992	336	534	429	398	117	84	16	5	108	144	498	1,446	4,115
1993	14,709	5,336	1,194	530	239	110	54	10	64	145	264	281	22,937
1994	388	493	497	319	163	80	20	7	37	102	193	941	3,239
1995	1,211	1,421	954	802	268	156	62	8	6	1	27	189	5,104
1996	666	896	730	315	151	46	7	0	54	154	307	510	3,836
1997	517	346	140	85	33	5	4	50	66	240	566	809	2,859
1998	18,997	8,508	3,837	961	667	347	81	91	70	139	190	186	34,074
1999	92	85	204	224	197	107	80	46	52	54	31	80	1,252

Note:

All monthly streamflows are measured in acre-feet.

TABLE C-10
Monthly Releases of Water from Castaic Lagoon to Castaic Creek
Regional Groundwater Flow Model Report for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1980	0	0	0	0	0	834	1,052	919	0	0	0	0	2,805
1981	105	0	0	1,490	46	0	0	0	0	0	0	0	1,641
1982	0	0	0	0	0	667	842	735	0	0	0	0	2,244
1983	0	0	0	0	0	1,168	1,473	1,287	0	0	0	0	3,928
1984	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	105	0	0	1,490	46	0	0	0	0	0	0	0	1,641
1987	105	0	0	1,490	46	0	0	0	0	0	212	0	1,853
1988	0	0	809	341	900	0	0	0	0	0	0	0	2,050
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	66	66
1992	0	0	580	3,052	667	127	24	0	0	0	0	0	4,450
1993	0	140	186	3,031	1,901	635	341	337	813	0	0	341	7,725
1994	210	0	0	2,979	93	0	0	0	0	0	0	0	3,282
1995	0	0	0	0	0	1,668	2,104	1,839	0	0	0	0	5,611
1996	0	0	0	4,961	671	0	0	0	0	0	0	0	5,632
1997	0	0	8701	873	0	0	0	0	0	0	0	310	9,884
1998	1,186	19,545	10,747	4,566	7,561	47	1,370	436	464	302	652	926	47,802
1999	612	691	0	3,187	1,191	149	0	0	0	0	0	0	5,830

Note:

All monthly releases are measured in acre-feet.

TABLE C-11
Monthly Treated Wastewater Discharge Measured at the Valencia Water Reclamation Plant
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1980	266	258	257	239	247	212	219	219	212	228	239	247	2,844
1981	248	220	249	235	244	237	253	255	248	263	285	270	3,006
1982	275	247	284	271	277	269	275	268	254	266	271	284	3,241
1983	286	261	301	288	296	277	287	296	282	286	276	295	3,432
1984	303	281	304	294	321	315	320	317	314	322	315	319	3,723
1985	309	283	316	316	333	331	354	359	348	361	357	341	4,006
1986	350	341	374	359	377	380	415	454	446	440	421	445	4,801
1987	455	415	472	489	550	567	603	594	579	633	600	624	6,582
1988	622	557	588	587	603	537	575	606	587	608	600	602	7,072
1989	622	593	695	666	671	708	714	731	668	678	673	676	8,095
1990	698	644	725	695	666	693	725	714	692	700	658	680	8,290
1991	715	662	702	627	668	646	647	691	709	743	717	748	8,276
1992	777	777	819	813	824	800	853	869	818	828	811	786	9,775
1993	778	733	863	858	869	925	910	846	816	834	818	858	10,107
1994	722	729	809	776	802	761	771	764	739	763	735	760	9,132
1995	889	777	935	887	884	848	853	814	826	834	823	855	10,225
1996	893	838	935	890	902	876	903	891	886	817	810	816	10,456
1997	815	713	866	829	852	879	860	851	824	826	778	775	9,867
1998	778	787	955	955	984	965	1,136	1,139	1,020	993	911	906	11,529
1999	930	868	962	953	985	968	1,003	1,018	961	1,020	1,040	987	11,695

Note:

All monthly releases are measured in acre-feet.

TABLE C-12
Monthly Treated Wastewater Discharge Measured at the Saugus Water Reclamation Plant
Regional Groundwater Flow Model Report for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1980	362	365	419	414	419	387	362	362	350	362	359	371	4,529
1981	382	337	390	398	444	412	417	429	431	434	412	460	4,945
1982	445	399	456	444	446	434	434	421	415	434	431	438	5,196
1983	460	421	514	541	562	545	520	477	458	481	477	534	5,990
1984	558	505	499	485	476	443	458	456	451	467	474	519	5,791
1985	503	461	505	458	448	444	452	459	452	470	460	498	5,610
1986	498	475	528	501	499	483	481	476	500	511	518	552	6,023
1987	524	475	542	487	425	383	391	403	395	397	411	430	5,264
1988	443	411	439	434	440	430	445	457	435	464	436	460	5,294
1989	462	410	441	450	464	436	476	479	462	471	451	466	5,468
1990	463	403	432	426	483	492	513	504	489	493	508	512	5,718
1991	495	423	479	427	491	516	557	525	486	474	470	493	5,835
1992	488	507	530	472	489	476	493	521	492	498	452	514	5,931
1993	595	534	616	581	615	587	622	604	578	609	567	567	7,075
1994	601	606	694	677	687	644	642	645	619	663	655	685	7,817
1995	657	578	676	705	699	631	641	635	617	613	568	581	7,602
1996	532	504	525	501	517	506	511	525	532	579	558	583	6,375
1997	564	516	515	461	469	417	442	474	475	503	521	553	5,911
1998	529	541	544	511	617	587	426	399	457	501	521	533	6,166
1999	542	485	551	391	544	512	547	532	521	527	487	514	6,153

Note:

All monthly discharges are measured in acre-feet.

TABLE C-13
Monthly Streamflows Measured in the Santa Clara River at the County Line Gage
Regional Groundwater Flow Model for the Santa Clarita Valley, Santa Clarita, California

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1980	8,428	43,565	18,125	8,551	3,792	3,963	1,202	1,111	1,668	1,470	1,452	1,884	95,211
1981	3,376	1,533	5,415	1,815	1,662	1,279	942	906	1,139	1,488	2,138	2,539	24,232
1982	2,826	2,358	5,572	7,091	3,909	1,749	1,694	1,392	1,597	1,621	3,449	3,229	36,488
1983	7,787	9,122	67,712	11,240	10,320	3,828	2,102	2,678	2,053	3,443	5,040	5,911	131,236
1984	5,691	3,931	4,084	4,530	2,309	1,607	1,224	1,511	1,464	1,624	3,237	8,067	39,279
1985	3,116	2,561	2,852	1,974	1,694	1,365	1,178	1,365	1,551	1,880	2,102	2,828	24,466
1986	3,955	13,991	10,616	3,328	2,612	1,622	1,454	1,482	1,870	1,896	2,606	2,590	48,024
1987	2,485	2,325	2,575	1,841	1,908	1,710	1,650	1,470	1,412	2,309	2,057	4,457	26,198
1988	3,421	2,981	3,025	3,172	2,636	2,231	1,734	1,494	1,605	1,904	2,027	10,381	36,611
1989	2,644	3,340	2,584	2,055	1,740	1,920	1,732	1,345	1,535	2,146	1,964	1,795	24,799
1990	2,709	3,247	2,269	1,898	1,730	1,545	1,478	1,751	1,668	1,660	1,924	1,593	23,472
1991	2,051	3,219	15,981	1,837	1,519	1,113	1,144	831	912	948	1,014	4,332	34,901
1992	3,737	37,636	9,576	4,439	1,964	1,533	1,377	1,085	1,129	1,329	1,496	3,277	68,577
1993	47,199	44,749	25,738	9,459	4,860	3,324	2,797	2,771	2,949	3,005	2,686	3,247	152,783
1994	3,281	3,437	3,501	3,533	3,519	2,200	1,640	1,400	1,192	1,855	2,263	4,219	32,039
1995	31,125	3,828	19,662	8,452	3,901	2,527	1,843	2,192	1,855	1,716	2,075	3,235	82,409
1996	3,604	10,669	7,678	6,073	3,584	1,678	1,640	1,579	1,509	2,625	1,590	5,701	47,930
1997	5,375	3,913	7,884	3,370	1,680	1,240	1,571	1,371	1,230	1,662	2,636	4,848	36,780
1998	5,875	104,388	25,377	9,378	34,992	5,312	3,935	3,537	2,579	2,450	2,890	4,427	205,139
1999	4,328	4,128	4,322	6,526	4,760	3,590	1,125	1,439	2,164	1,888	2,243	2,434	32,382

Note:

All monthly streamflows are measured in acre-feet.

Figures

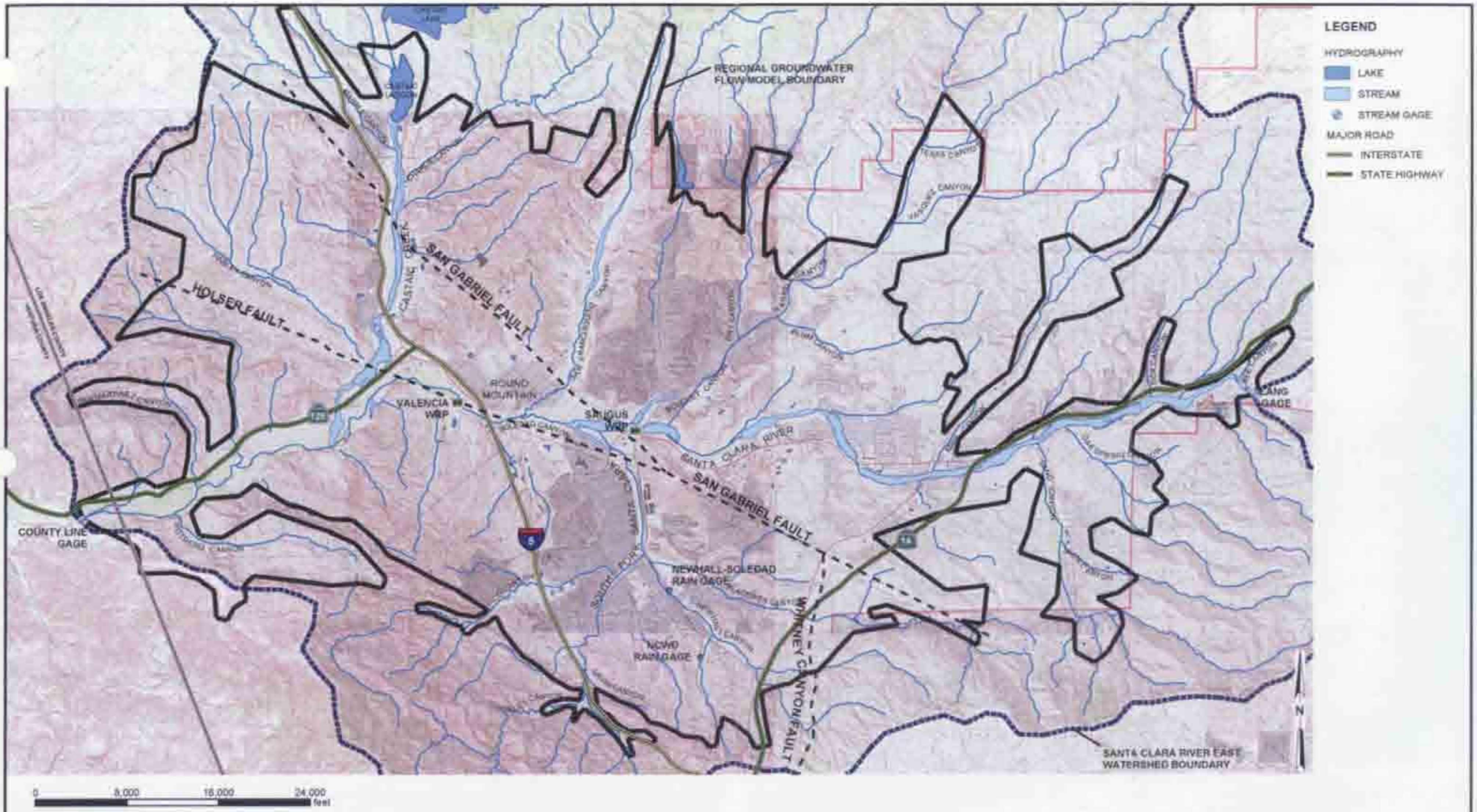

FIGURE C-1
MAP OF STUDY AREA
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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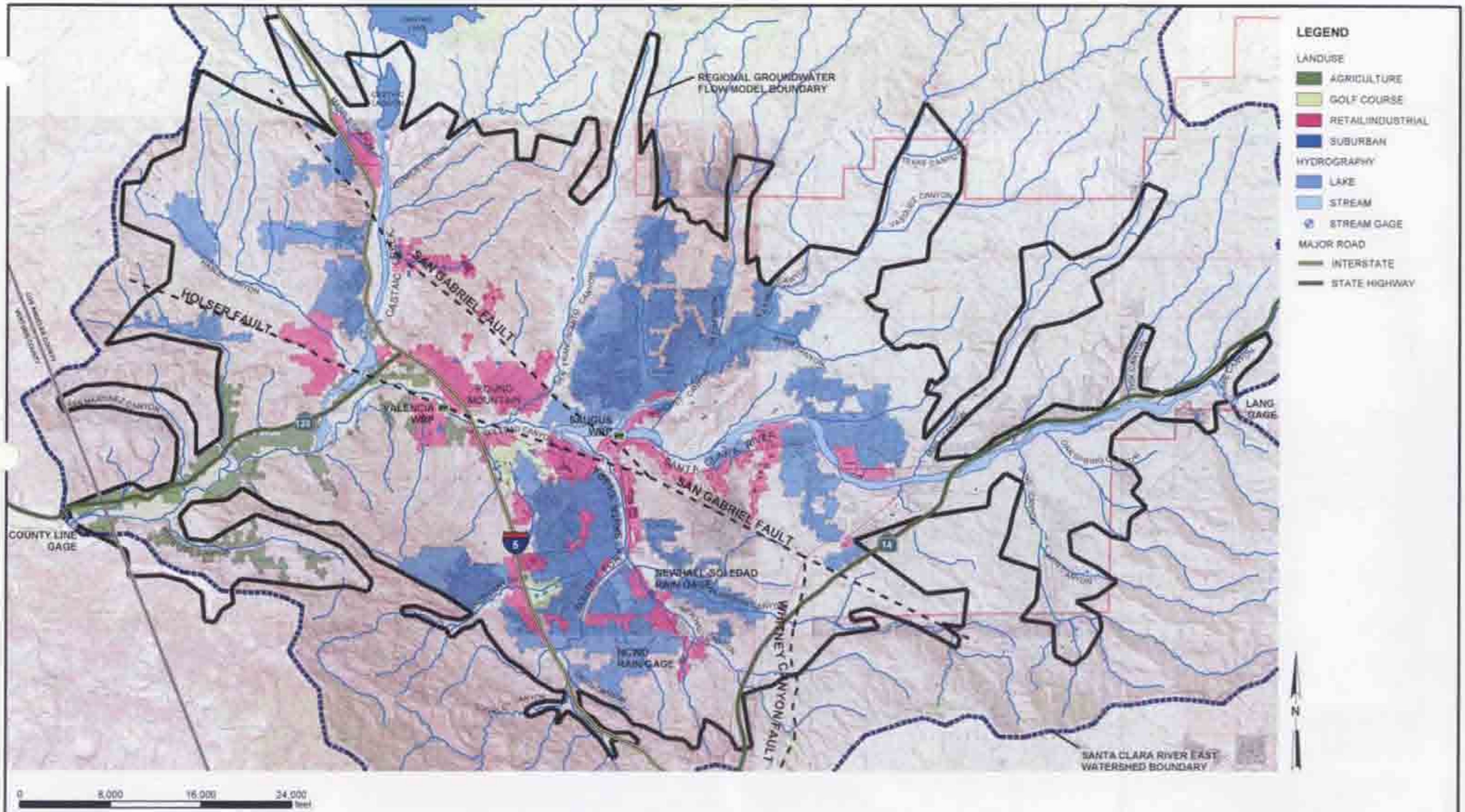

FIGURE C-2
LAND USE MAP
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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RDD \\ODIN\PROJ\165\SANTACLARITA_MOU\FIGURES\MXD\FIGC-06.MXD FIGC-02.PDF 02/03/2004 09:38:51

Year	Acres				Acreage %		
	Alfalfa	Sudan	Vegetables	Total	Alfalfa	Sudan	Vegetables
1996	105	170	537	812	12.9%	20.9%	66.1%
1997	160	103	663	926	17.3%	11.1%	71.6%
1998	115	100	590	805	14.3%	12.4%	73.3%
1999	55	150	709	914	6.0%	16.4%	77.6%
2000	55	150	722	927	5.9%	16.2%	77.9%
Average	**98**	**134.6**	**644.2**	**876.8**	**11.3%**	**15.4%**	**73.3%**

Year	CIMIS AF/yr		
	Alfalfa	Sudan	Vegetables
1996	10.21	10.21	7.3
1997	10.22	10.22	7.3
1998	9.4	9.4	6.71
1999	10.51	10.51	7.51
2000	10.37	10.37	7.41
Average	**10.142**	**10.142**	**7.246**

Year	Water Use (AF/yr)			
	Alfalfa	Sudan	Vegetables	Total
1996	1,072	1,736	3,920	6,728
1997	1,635	1,053	4,840	7,528
1998	1,081	940	3,959	5,980
1999	578	1,577	5,325	7,479
2000	570	1,556	5,350	7,476
Average	**987**	**1,372**	**4,679**	**7,038**

Data Source: Appendix 2.5(m) of *Draft Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant, Final Environmental Impact Report* Impact Sciences, Inc., April 2001)

Crop Efficiency		
Alfalfa	Sudan	Vegetables
50%	**50%**	**70%**

Year	Estimated Infiltration (AF/yr)			
	Alfalfa	Sudan	Vegetables	Total
1996	536	868	1,176	2,580
1997	818	526	1,452	2,796
1998	541	470	1,188	2,198
1999	289	788	1,597	2,675
2000	285	778	1,605	2,668
Average	**494**	**686**	**1,404**	**2,583**

Year	Estimated Infiltration (AF/acre/yr)			
	Alfalfa	Sudan	Vegetables	Total
1996	5.1	5.1	2.2	3.2
1997	5.1	5.1	2.2	3.0
1998	4.7	4.7	2.0	2.7
1999	5.3	5.3	2.3	2.9
2000	5.2	5.2	2.2	2.9
Average	**5.1**	**5.1**	**2.2**	**2.9**

This represents the average deep percolation on irrigated acreage during the past 5 years, consistent with the water application of an average 7,038 AF/yr during this period. Values are in AF/acre/year, which is equivalent to feet/year.

FIGURE C-3
ANALYSIS OF AGRICULTURAL WATER USE AND ASSOCIATED INFILTRATION TO GROUNDWATER
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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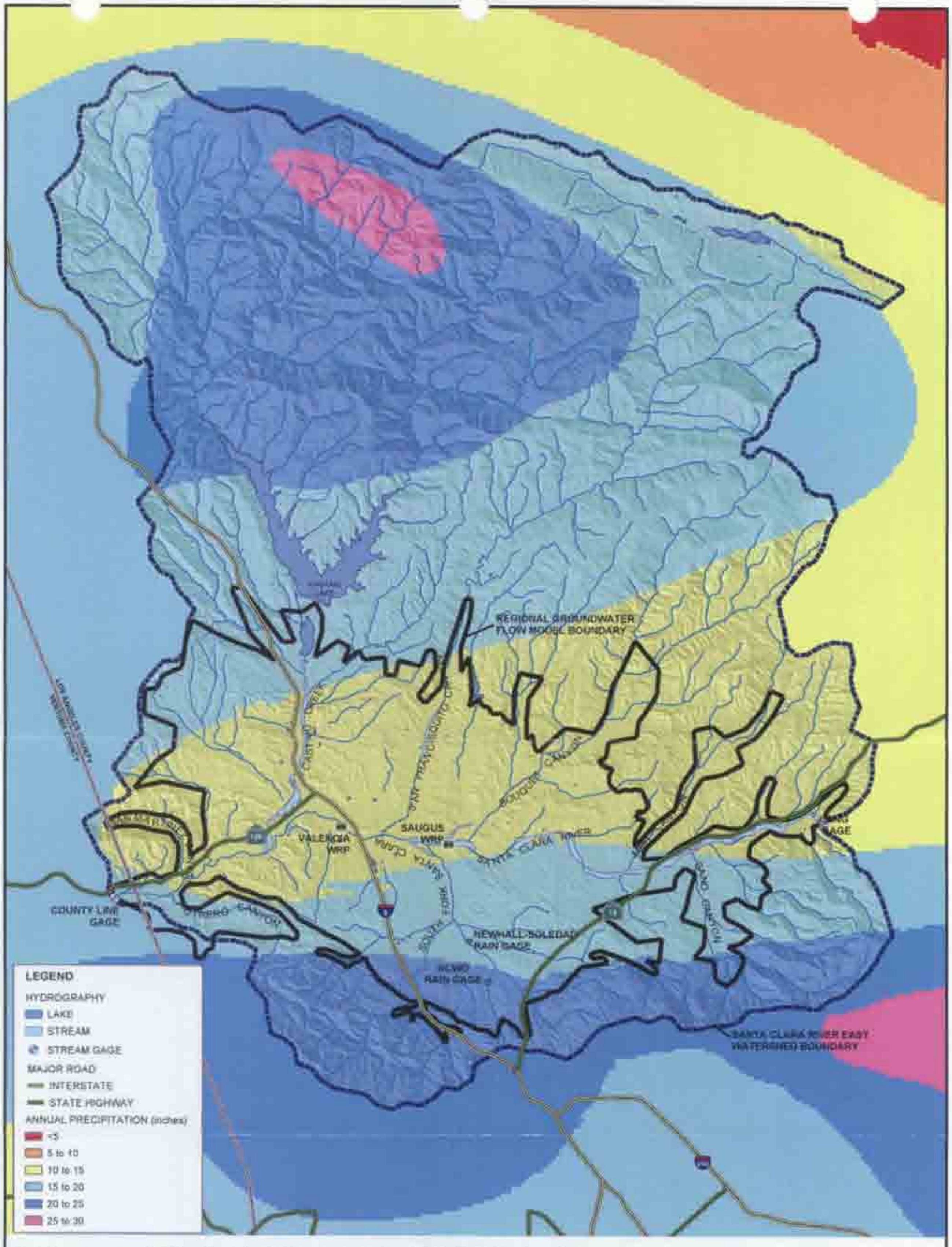

SOURCE: SEE THE INTERNET SITE HTTP://GIS.CA.GOV/META.EPL?OID=286 FOR MORE INFORMATION

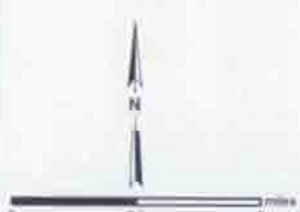

FIGURE C-4
ISOHYETAL MAP SHOWING AVERAGE ANNUAL PRECIPITATION PATTERN FROM 1900 TO 1960
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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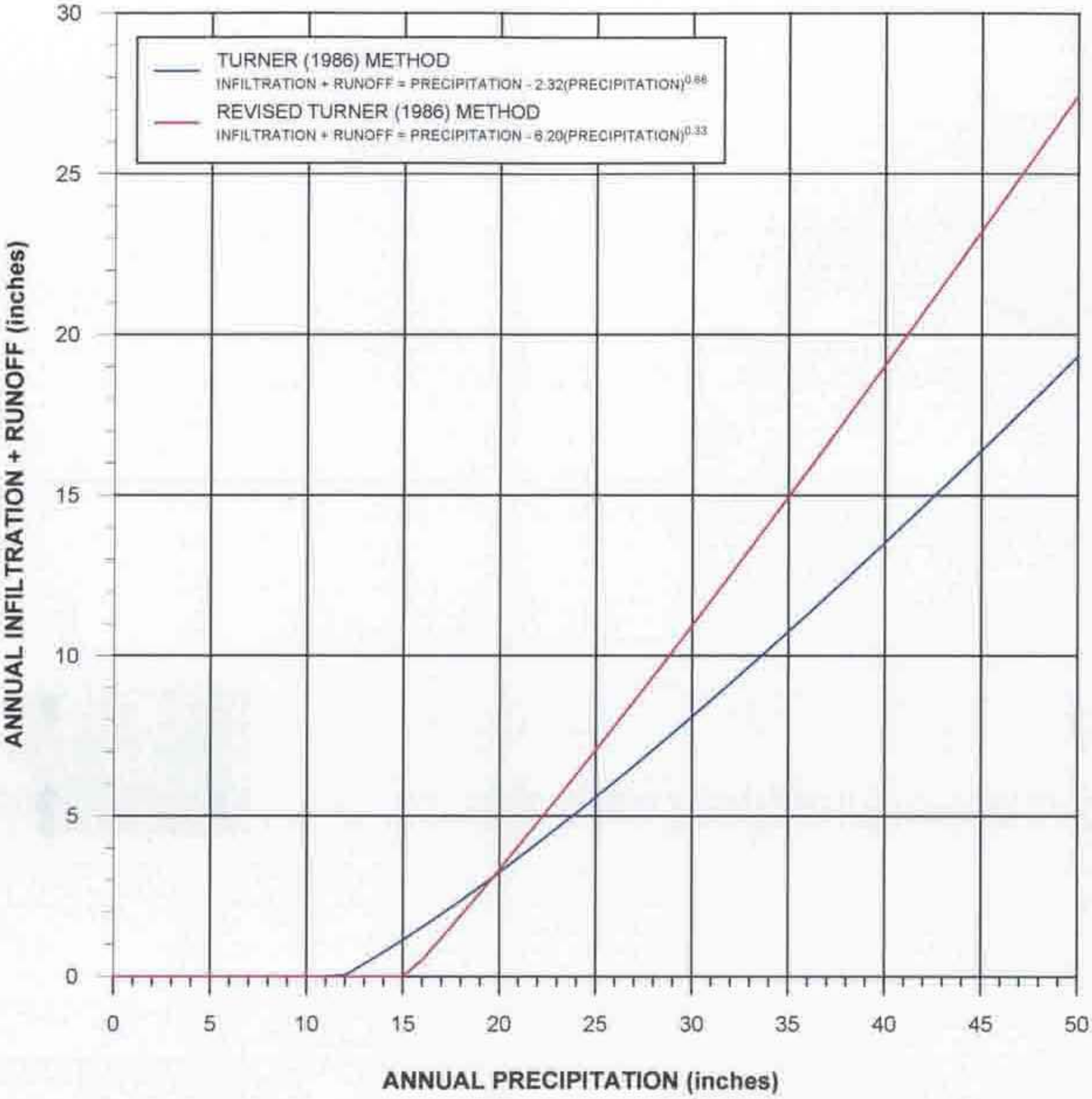


SOURCE:

TURNER, K.M. 1986. WATER LOSS FROM FOREST AND RANGE LANDS IN CALIFORNIA. *IN* PROCEEDINGS OF THE CHAPPARRAL ECOSYSTEMS CONFERENCE, SANTA BARBARA, CALIFORNIA, MAY 16-17, 1986, J. DEVRIES (EDITOR). WATER RESOURCES CENTER, REPORT 62, UNIVERSITY OF CALIFORNIA-DAVIS, CALIFORNIA, PP. 63-66.

FIGURE C-5
INFILTRATION AND RUNOFF AS A FUNCTION OF PRECIPITATION

REGIONAL GROUNDWATER MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-344.GRF

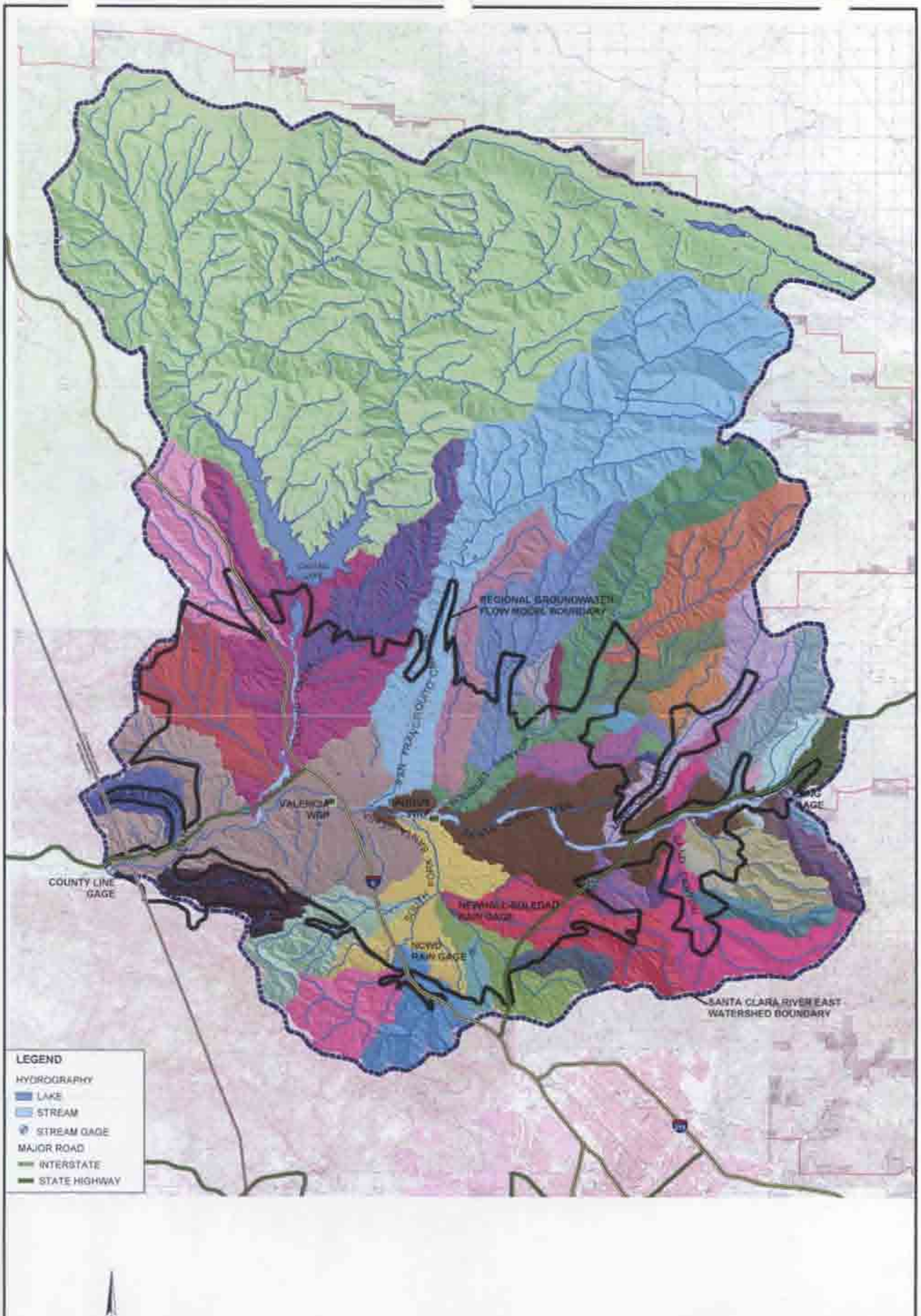
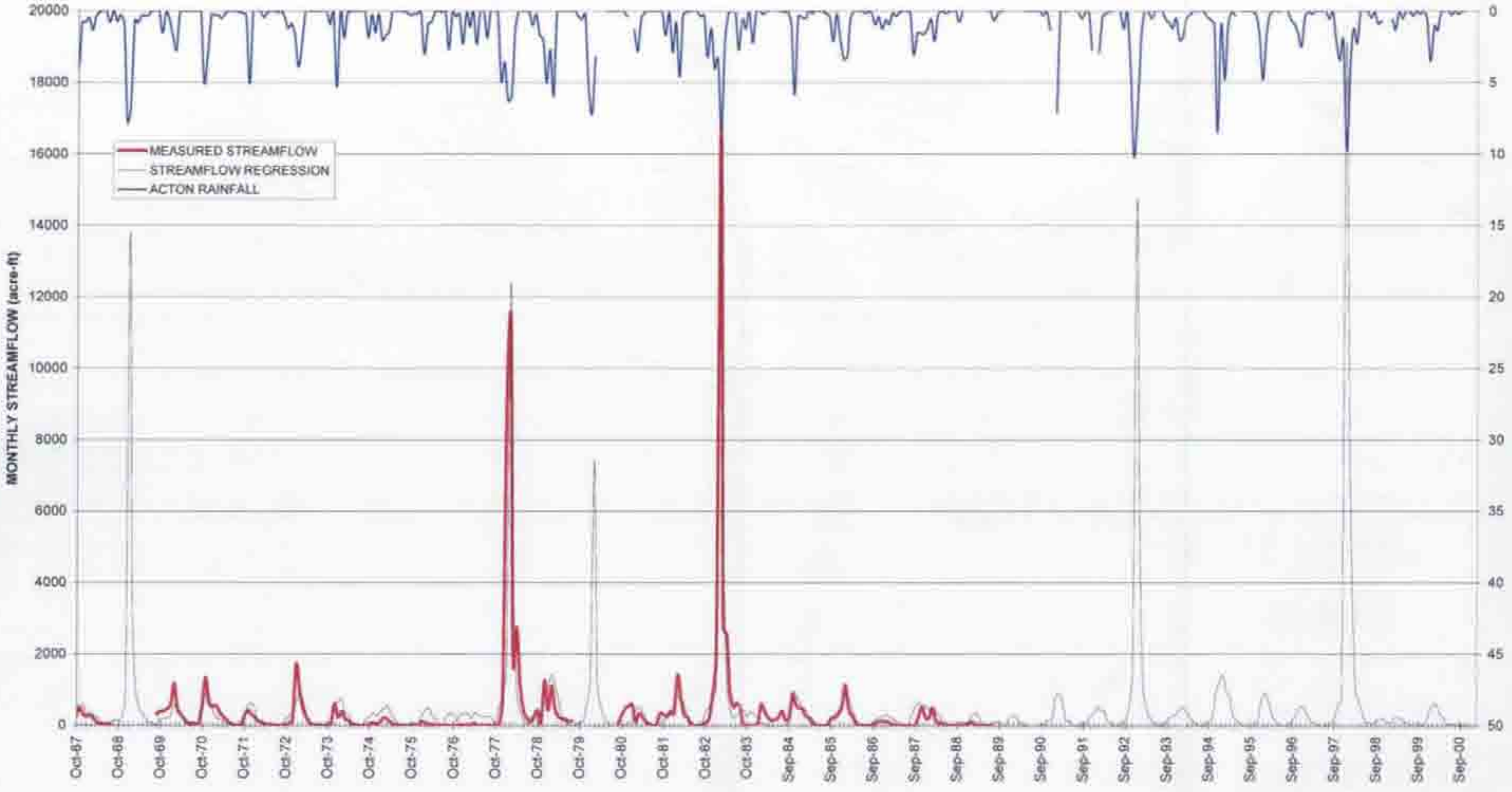


FIGURE C-6
SUBWATERSHEDS WITHIN THE
SANTA CLARA VALLEY EAST WATERSHED
REGIONAL GROUNDWATER FLOW MODEL
REPORT FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL



REGRESSION EQUATION
MONTHLY STREAMFLOW AT LANG = 90.00*1 mo + 120.00*2 mo + 100.00*3 mo + 20.00*4 mo + 20.00*5 mo + 2.00*6 mo

FIGURE C-7
SANTA CLARA RIVER STREAMFLOW REGRESSION
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

176973-408.xls/FIG C-7

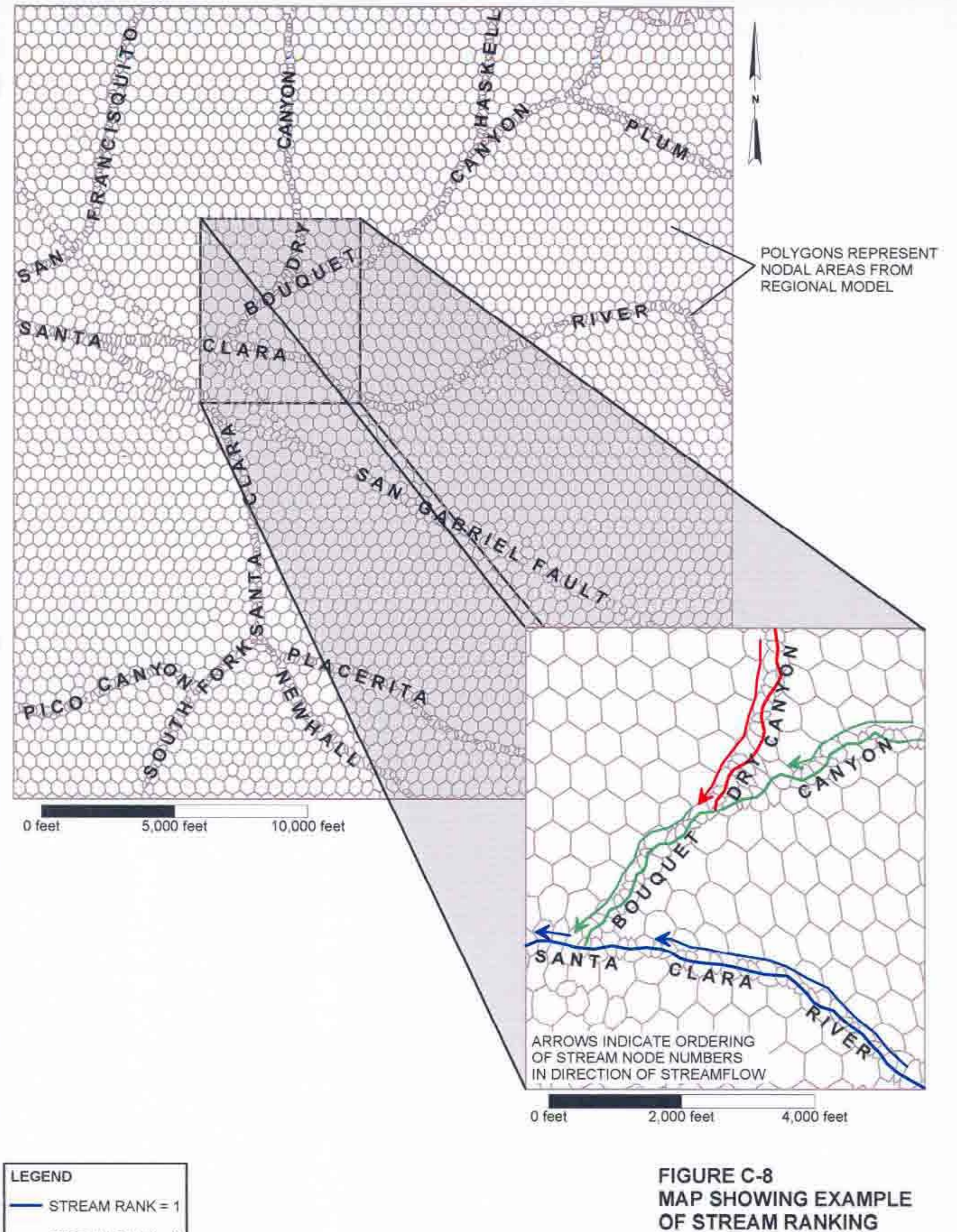


FIGURE C-8
MAP SHOWING EXAMPLE OF STREAM RANKING
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

CH2MHILL

178973-401.SRF

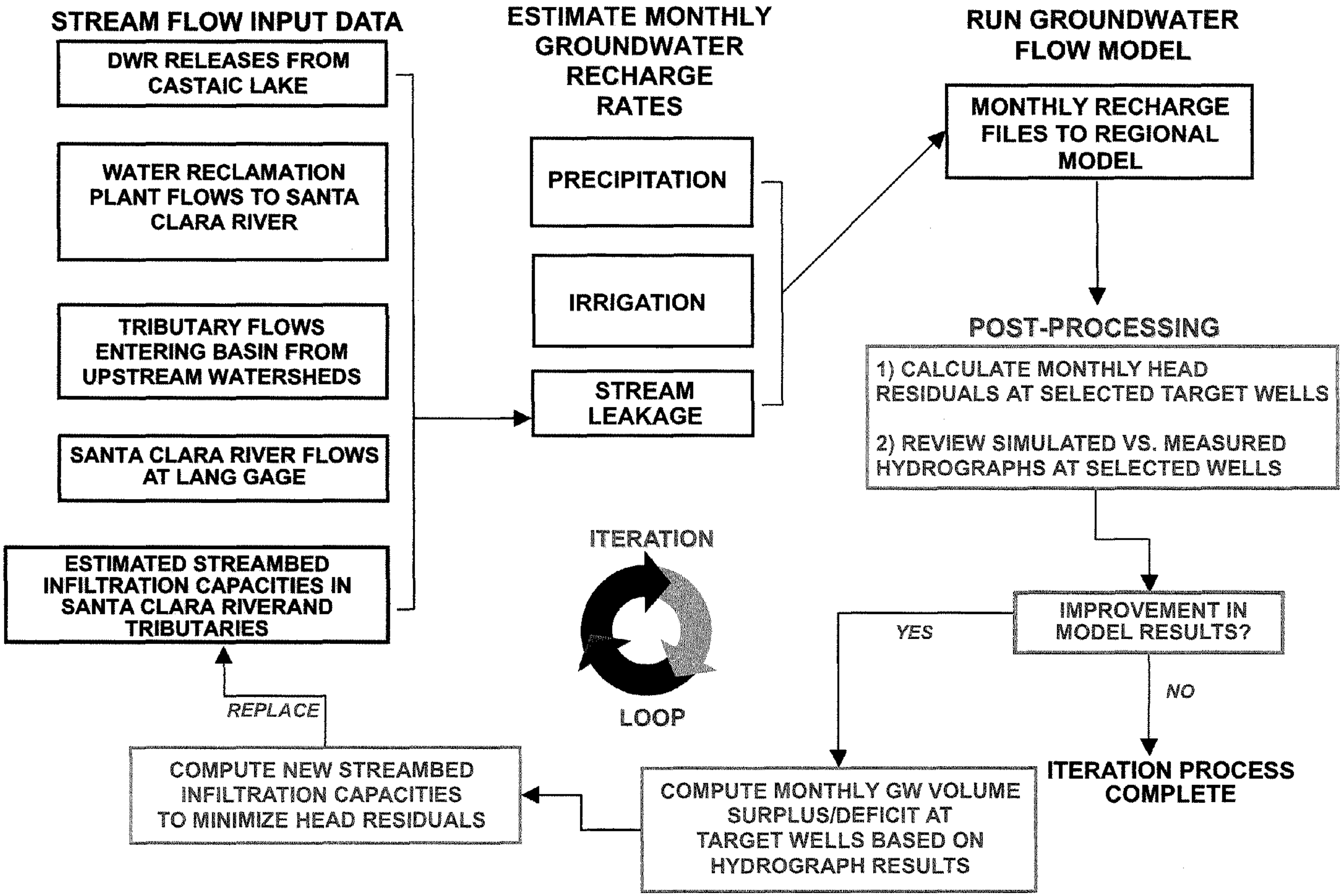


FIGURE C-9
FLOW CHART SHOWING ITERATIVE PROCESS USED TO VARY STREAMBED INFILTRATION CAPACITIES DURING MODEL CALIBRATION
REGIONAL GROUNDWATER FLOW MODEL
FOR THE SANTA CLARITA VALLEY
SANTA CLARITA, CALIFORNIA

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