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WATER RESOURCES DATA

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Technical Memorandum

Model Documentation
Proposed CPV Sentinel Energy Project

Mission Creek Sub-Basin
Riverside County, California

prepared for:

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by

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INTRODUCTION and MODEL OBJECTIVES

A three-dimensional groundwater flow model was constructed for the Mission Creek Subbasin (subbasin) in Riverside County, California. This groundwater flow model was developed to evaluate potential impacts of pumping and percolation on the subbasin. MODFLOW, a groundwater modeling program developed by the U.S. Geological Survey (USGS), was used for the simulation.

The primary objective of this model is to evaluate the effects of pumping and percolation on the subbasin by:

1. Simulating groundwater flow conditions and subbasin response to pumping and percolation;
2. Providing sufficiently fine grid spacing to simulate pumping via extraction wells and percolation via surface infiltration basins; and
3. Evaluating the sensitivity of flow in the subbasin to the number of pumping wells.

BACKGROUND

CPV Sentinel, LLC proposes to construct a power plant (CPV Sentinel Energy Project (CPVS)) to be located in the portions of the southeastern quarter and portions of the southwestern quarter of Section 4, Township 3 south, and Range 4 east of the Desert Hot Springs 7.5-Minute Topographic Map, approximately 8 miles northwest of the center of the City of Palm Springs and 5 miles west of the center of Desert Hot Springs, California.

The proposed project will use reclaimed water supplied by the Mission Springs Water District's ("MSWD") Horton Wastewater Treatment Plant (WWTP). The reclaimed water will be discharged to existing percolation ponds located adjacent to the Horton WWTP, where it will percolate into the underlying Mission Creek Subbasin, which is part of the Coachella Valley Groundwater Basin (Basin), and will be banked for later use by the proposed project. CPVS will purchase from MSWD, at the Horton WWTP,

1,500 acre-feet per year (afy) of reclaimed water, of which, the proposed project is expected to use up to approximately 1,100 afy. The proposed project will access its banked water in the Basin via onsite wells. The proposed project is expected to be dispatched, on a lifetime average basis, approximately half of the maximum annual permitted capacity, resulting in an expected lifetime average extraction of 550 afy from the Basin.

In addition, an equivalent amount of water will be percolated at the Desert Water Agency's (DWA's) Mission Creek Recharge Basin (DWA basin), located approximately 3.2 miles north, and cross gradient, of the power plant. Water replenished at the DWA basin will come from Metropolitan Water District's Colorado River Aqueduct through an exchange contract in order to offset drawdown caused by water extraction. Consequently, the model simulates long-term groundwater response to groundwater pumping near the power plant and percolation at the two surface basins.

HYDROGEOLOGIC SETTING

The Mission Creek Subbasin is located within the Colorado Desert geomorphic province in the northwest region of Coachella Valley. The subbasin is bound by the Mission Creek Fault on the north, the Banning Fault on the south, the San Bernadino Mountains on the west, and the Indio Hills on the southeast (Figure 1). Groundwater within the basin occurs in an unconfined state and based on a study by Tyley (1974), generally flows southeast, parallel to the faults. The faults generally act as barriers to groundwater flow. Primary water-bearing deposits in the subbasin are relatively unconsolidated late Pleistocene deposits, Holocene alluvial fan deposits, and terrace deposits (State of California Department of Water Resources, 2003).

MODEL CODES

This section describes model computer codes used to build the model.

Groundwater Modeling System Interface

The computer software program chosen as the graphical interface for the modeling effort was the U.S. Department of Defense Groundwater Modeling System (GMS), version 6.0. GMS is a comprehensive graphical user interface (GUI) for performing groundwater simulations. GMS provides a graphical preprocessor and postprocessor interface to several groundwater modeling codes: MODFLOW, MODPATH, MT3DMS, RT3D, FEMWATER, SEEP2D, NUFT, and UTCHEM. The GMS interface was developed by the Environmental Modeling Research Laboratory of Brigham Young University in partnership with the U.S. Army Engineering Waterways Experiment Station. GMS was used to develop a simplified site conceptual hydrogeological model and to convert it into a groundwater flow model.

MODFLOW Groundwater Flow Model

The computer code selected to model groundwater flow beneath the site was MODFLOW. MODFLOW is a three-dimensional, cell-centered, finite difference, saturated flow model developed by the USGS (McDonald and Harbaugh, 1988). GMS provides an interface to the updated version, MODFLOW 2000 (Hill et al, 2000). Based on the information available, the uncertainty associated with site information, and the modeling objective of evaluating the affect of pumping and percolation, MODFLOW was considered an appropriate groundwater flow code.

NUMERICAL FLOW MODEL

Model Domain and Grid

The model domain encompasses the Mission Creek Subbasin from the base of the San Bernadino Mountains in the west to the Indio Hills in the east, and extends from the Mission Creek Fault in the north to the Banning Fault in the south. The model domain covers an area of approximately 64 square miles: approximately 16 miles long and ranging in width from approximately 6.5 miles along the western edge of the domain to approximately 1.5 miles along the eastern edge of the domain (Figure 2). The model has one layer with a thickness of 1,300 feet, extending from approximately 300 feet above the water table to the base of the aquifer, which is approximately 1,000 feet below the water table.

The model grid contains 83,760 cells, spatially discretized into 266 columns in length, 315 rows in width and 1 layer in height (Figure 3). The model grid is refined both in the vicinity of the pumping wells and the two recharge basins. Lateral cell size of 20 by 20 feet was specified in the vicinity of the pumping wells and increases towards the model domain boundaries. The maximum cell size, at the model boundary, is approximately 970 by 1,300 feet.

Hydraulic Conductivity

The hydraulic conductivity (K) distribution defined in the model was based on literature values of transmissivity (T) provided in Tyley (1974). Tyley (1974) determined the T distribution by analysis and evaluation of approximately 800 drillers' logs, aquifer tests, and specific capacity tests conducted by Southern California Edison Co within the Garnet Hill Subbasin, located south of the model domain, and the Mission Creek Subbasin. As shown on Figure 4, transmissivity ranges from 2,000 gallons per day per foot (gpd/ft) in the eastern and western edges of the model domain, to 200,000 gpd/ft near the Mission

Creek streambed north of the Banning fault (Tyley, 1974). K was calculated assuming a saturated thickness of 1,000 feet for the whole subbasin.

Storage Coefficient

The storage coefficient, or specific yield, distribution defined in the model was based on values provided by Tyley (1974). Tyley (1974) estimated specific yield based on drillers' logs of borings drilled within the unconfined aquifer. Model values of specific yield range from 0.08 in the western region of the model domain to 0.18 in the central region of the model domain (Figure 5).

Pumping

The model simulates pumping from a proposed well field at the power plant. Assuming that the long-term average annual extraction for the power plant water will be 550 afy, the average pumping rate will be approximately 341 gpm.

Pumping is simulated with both five and three pumping wells (Figure 6). Note that Well #1, Well #4, and Well #5, as shown on Figure 6, are used as the three pumping wells. The pumping rate is divided evenly among the wells, resulting in a pumping rate of 68 gpm at each well when simulating extraction from five wells, and 114 gpm when simulating extraction from three wells. The pumping rate is assumed to be steady and continuous throughout the 30-year model simulation.

To evaluate the net effect of power plant pumping, it is assumed that no other wells are extracting groundwater from the aquifer or injecting water into the aquifer within the model domain.

Net Recharge

The model simulates percolation into the subbasin at both the DWA basin and the Horton WWTP ponds. An equivalent quantity of water, 550 afy, will be diverted from the Colorado River Aqueduct through an exchange agreement with the Metropolitan Water District and discharged to the DWA basin, located approximately 3.2 miles north of the power plant. The project will purchase reclaimed water from the Horton WWTP, which will be percolated into the subbasin via percolation ponds. On average, the amount of water to be percolated at the Horton WWTP on an annual average basis is approximately 1,500 afy. Consequently, total simulated percolation is more than 3.5 times the volume pumped by power plant extraction wells.

A time lag will occur between the application of water at the surface basins and the time it takes for the water to percolate and reach the water table, which is more than 300 feet below the surface. The time lag is estimated to be approximately 90 days based on a published infiltration rate at the Horton WWTP ponds of 0.67 feet per day (ft/day) and a depth to groundwater of 300 feet (California Regional Water Quality Control Board Colorado River Basin Region, 2001), and assuming an effective porosity of 0.20. Based on a report by Richard C. Slade & Associates, LLC (2000), the infiltration rate in the vicinity of the DWA basin ranges from 0.1 to 2 ft/day. Due to the lack of more specific data, and since this range is consistent with the infiltration rate at the Horton WWTP ponds, the same time lag was assumed for the DWA basin.

However, due to the lack of site-specific infiltration rate data, a time lag sensitivity analysis was conducted by running a simulation with a 365-day time lag. Results showed that the model was insensitive to the time lag, and therefore, the more conservative time lag of 365 days was used for model simulations.

The model assumes that evaporation of water in the surface basins will not occur. No additional sources of percolation were simulated by the model.

Initial and Boundary Conditions

Due to the lack of data (e.g., measured groundwater elevations, current groundwater extractions, and recharge to the aquifer system, etc.), the current groundwater conditions cannot be obtained from either data interpolation or model simulation. However, the primary model objective was to evaluate the subbasin response to pumping and percolation. Specifically, the model was developed to evaluate drawdown and rise resulting exclusively from pumping at the power plant and percolation at the Horton WWTP ponds and the DWA basin. Consequently, the initial head distribution was specified as a constant head distribution with a uniform saturated thickness of 1,000, based on an estimated average saturated thickness, throughout the model domain.

Historical groundwater elevation contour maps (Tyley, 1974) show that significant head differences existed between the Mission Creek Subbasin and the Desert Hot Springs Subbasin, located to the north of the model domain and separated by the Mission Creek Fault, and between the Mission Creek Subbasin and the Garnet Hill Subbasin, located to the south of the model domain and separated by the Banning Fault. These maps also show that groundwater flows within the Mission Creek Subbasin are approximately parallel to the Mission Creek Fault and the Banning Fault. These maps indicate that the Mission Creek Fault and the Banning Fault hydraulically separate the Mission Creek Subbasin aquifer system from the Desert Hot Springs Subbasin and the Garnet Hill Subbasin, respectively. Consequently, the northern and southern model boundaries representing the Mission Creek Fault and the Banning Fault, respectively, were specified as no-flow boundary conditions and do not allow flow in or out across the model boundaries. Both eastern and western boundaries are specified as a general head boundary, allowing flows in and out of the model domain based on the water level elevation changes in the model domain.

Timing of Model Stresses

The model simulated transient flow conditions for 30 years. Stress periods were set to one year. Power plant extraction well pumping was constant throughout the simulation, while percolation began 365 days into the simulation and remained constant thereafter.

MODEL SIMULATIONS

The model simulated subbasin flow and response for 30 years under two scenarios, each of which simulated pumping with five and three extraction wells. Model results are summarized in Table 1.

Scenario A

Scenario A simulated 1,500 afy, or 930 gpm of percolation to the Horton WWTP ponds and 550 afy, or 341 gpm of percolation at the DWA basin. Percolation at the DWA basin equaled the volume of water extracted. Scenario A included two simulations: one with five and one with three power plant extraction wells. The total extraction flow rate was 341 gpm, and consequently, the flow rate at each extraction well was 68 gpm and 114 gpm using five and three extraction wells, respectively. Thus, the total volume of water percolated to the subbasin was over 3.7 times the volume extracted.

Model simulation results show drawdown at the pumping area during early simulation times and water table rise at the percolation basins throughout the simulation. Model simulation results are similar with both five and three extraction wells. The maximum drawdown at the pumping wells was 3.0 feet using five wells and 3.4 feet using three wells, each occurring approximately 3 years after pumping began. After approximately 3 years, the water from the recharge basins started to significantly affect the drawdown in the pumping area and water level elevations began to rise in the pumping area. After approximately 13 years, the water from the percolation basins negates the drawdown in the pumping area and water level elevations begin to rise above initial water level

elevations. At the end of the simulation (30 years), the water table at the pumping wells rose between 5.7 and 6.0 feet with five extraction wells and between 5.2 and 6.3 feet with three extraction wells. The water table beneath the DWA basin and the Horton WWTP ponds rose between 12.4 and 20.7 feet, respectively, using either five or three wells.

Hydrographs illustrating simulated drawdown at the pumping wells and mounding at the surface basins are presented as Figures 7 through 10. Resulting water level elevation contours are presented in Appendix A.

Scenario B

Scenario B assumed that water would not be percolated at the Horton WWTP ponds on behalf of the project. The long-term extraction from the onsite wells and percolation at the DWA basin remained the same as in Scenario A. Thus, the total volume of water percolated to the subbasin was equal to the volume extracted. The model was otherwise the same as Scenario A.

Simulation results show that the maximum drawdown at the extraction wells increased slightly, from 3.0 feet (Scenario A) to 3.2 feet with five extraction wells and from 3.4 (Scenario A) to 3.6 feet with three extraction wells. Drawdown at the extraction wells nearly stabilized after 5 years, but continued to increase slightly with time. After a simulation period of 30 years, the water table beneath the DWA basin rose 4.0 and 3.9 feet with five and three wells, respectively. Due to the lack of percolation, the water table beneath the Horton WWTP ponds did not rise, and in fact declined slightly throughout the simulation due to the water extraction from the pumping wells. The maximum drawdown was approximately 0.4 feet after 30 years, using both five and three extraction wells. Model simulation results are similar with both five and three extraction wells.

Hydrographs illustrating simulated drawdown at the pumping wells and response at the surface basins are presented as Figures 11 through 14. Resulting water elevation contours are presented in Appendix A.

DISCUSSION

Simulation results show that the model is relatively insensitive to the number of extraction wells, provided that the total extraction flow rate remains the same. Results show that percolation at the Horton WWTP on behalf of the project does not significantly affect the maximum amount of drawdown at the pumping wells during the 30-year simulation period. However, percolation at Horton WWTP does affect the time at which maximum drawdown occurs at the pumping wells, and results in an increase in water levels at the pumping wells. With Horton WWTP percolation (Scenario A), the maximum drawdown at the pumping wells is achieved three years into the simulation, after which the percolated water begins to offset pumping and causes water levels to increase. However, without Horton WWTP percolation (Scenario B), drawdown at the extraction wells stabilizes after approximately five years, but continues to increase very slightly throughout the simulation. Without Horton WWTP percolation, water levels do not increase at the extraction wells.

The simulated water table rose approximately 12.4 feet at the DWA basin and approximately 20.7 feet at the Horton WWTP ponds when water was percolated at the DWA basin and at the Horton WWTP in Scenario A. However, when water was not percolated at Horton WWTP in Scenario B, the water table rose only approximately 4.0 feet at the DWA basin and exhibited drawdown up to approximately 0.4 feet at the Horton WWTP ponds. Results show that the water table beneath the DWA basin, the Horton WWTP ponds, and in the extraction well area is affected by percolation at Horton WWTP.

MODEL LIMITATIONS

The model was constructed in a cost-effective way to meet the model objectives. The model was developed to evaluate the potential impacts of pumping and percolation on the subbasin. Any groundwater model, including this screening-type model, is a simplification of the natural environment and therefore has recognized limitations.

Respectfully submitted,

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ATTACHMENTS

Table 1 Summary of Simulation Results

Figure 1 Groundwater Subbasin Map
Figure 2 Model Domain
Figure 3 Finite-Difference Discretization
Figure 4 Transmissivity Distribution Used in Groundwater Flow Model
Figure 5 Specific Yield Distribution Used in Groundwater Flow Model
Figure 6 Pumping Well Locations at the Site
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Figure 8 Groundwater Elevation Increases at Surface Basins – Scenario A, 5 Wells
Figure 9 Drawdown Versus Time at Pumping Wells – Scenario A, 3 Wells
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Appendix A Simulated Water Level Contours

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TABLES

Table 1: Summary of Simulation Results

Simulations	Maximum drawdown at onsite wells (ft)	Time of maximum drawdown (year)	Water level rise at onsite wells after 30 years (ft)	Water level rise at DWA Basin after 30 years (ft)	Water level rise at Horton WWTP ponds after 30 years (ft)
Scenario A, 5 Wells	3.0	3	5.7 - 6.0	12.4	20.7
Scenario A, 3 Wells	3.4	3	5.2 - 6.3	12.4	20.7
Scenario B, 5 Wells	3.2	5	0	4.0	0.0
Scenario B, 3 Wells	3.6	5	0	3.9	0.0

Notes:

1. Scenario A, 5 Wells: 5 pumping wells @ 68 gpm (total of 342 gpm). Percolation at both DWA basin and Horton ponds.
2. Scenario A, 3 Wells: 3 pumping wells @ 114 gpm (total of 342 gpm). Percolation at both DWA basin and Horton ponds.
3. Scenario B, 5 Wells: 5 pumping wells @ 68 gpm (total of 342 gpm). Percolation at DWA basin, but not at Horton ponds.
4. Scenario B, 3 Wells: 3 pumping wells @ 114 gpm (total of 342 gpm). Percolation at DWA basin, but not at Horton ponds.

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FIGURES

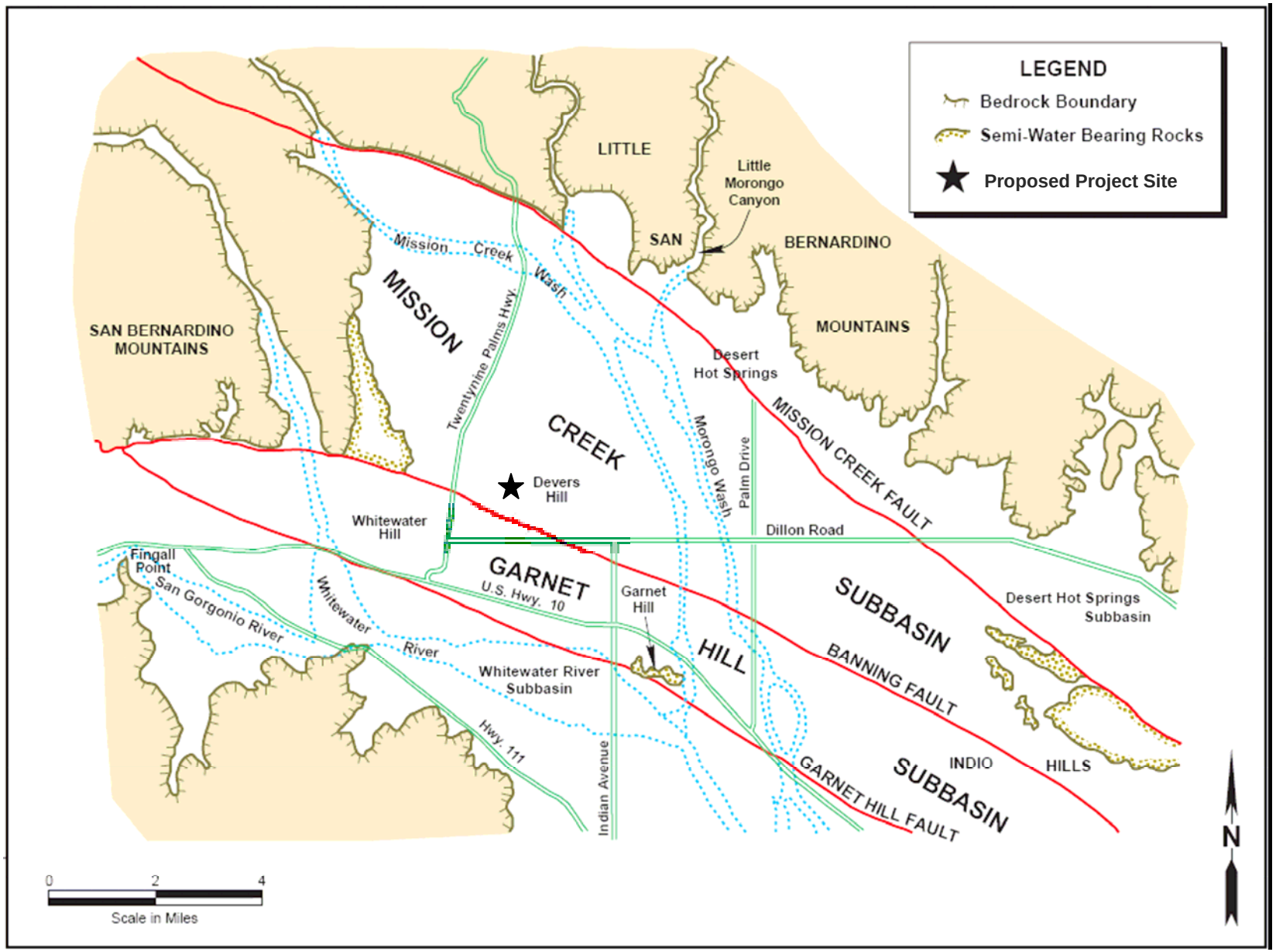

Figure 1: Groundwater Subbasin Map

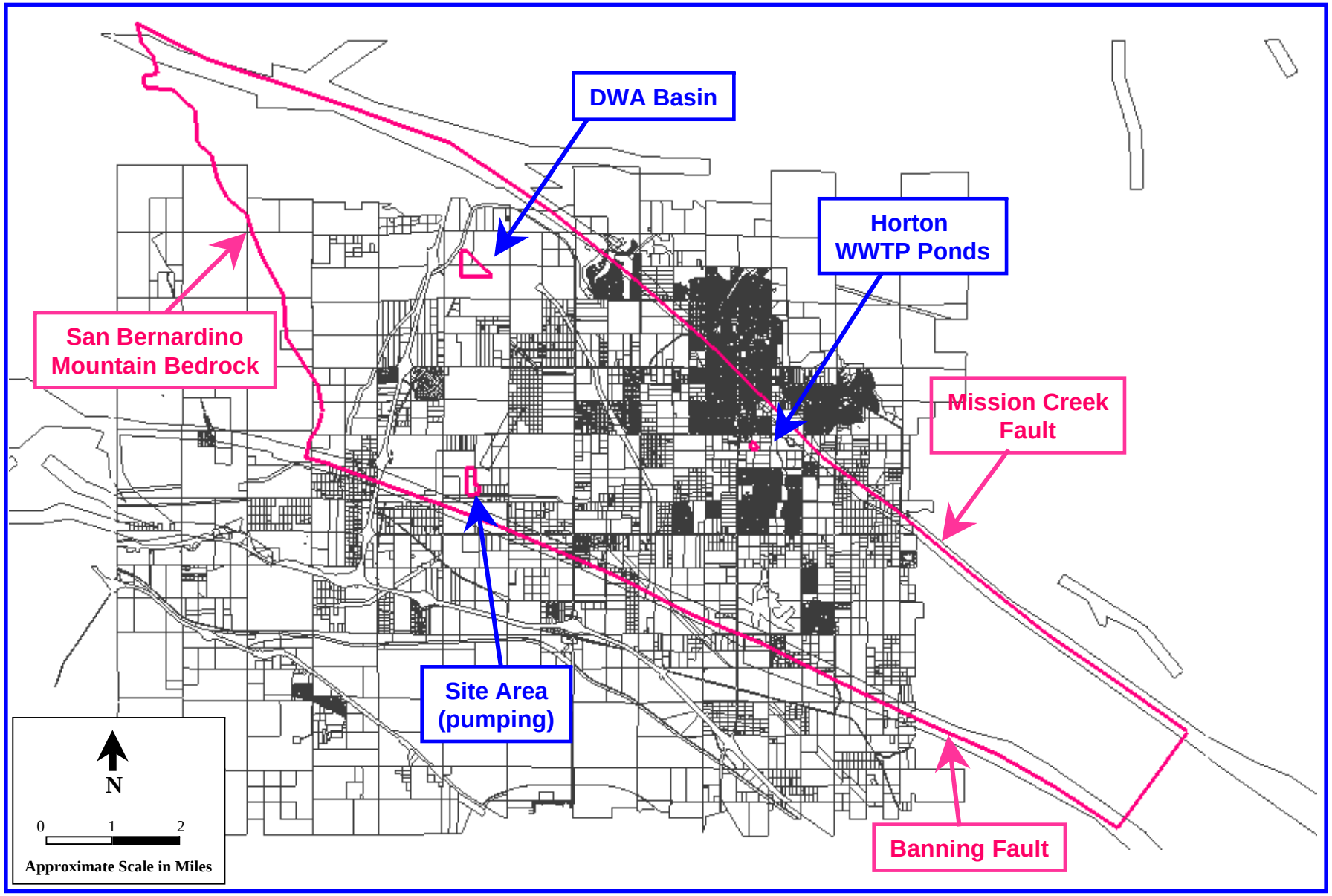

Figure 2: Model Domain

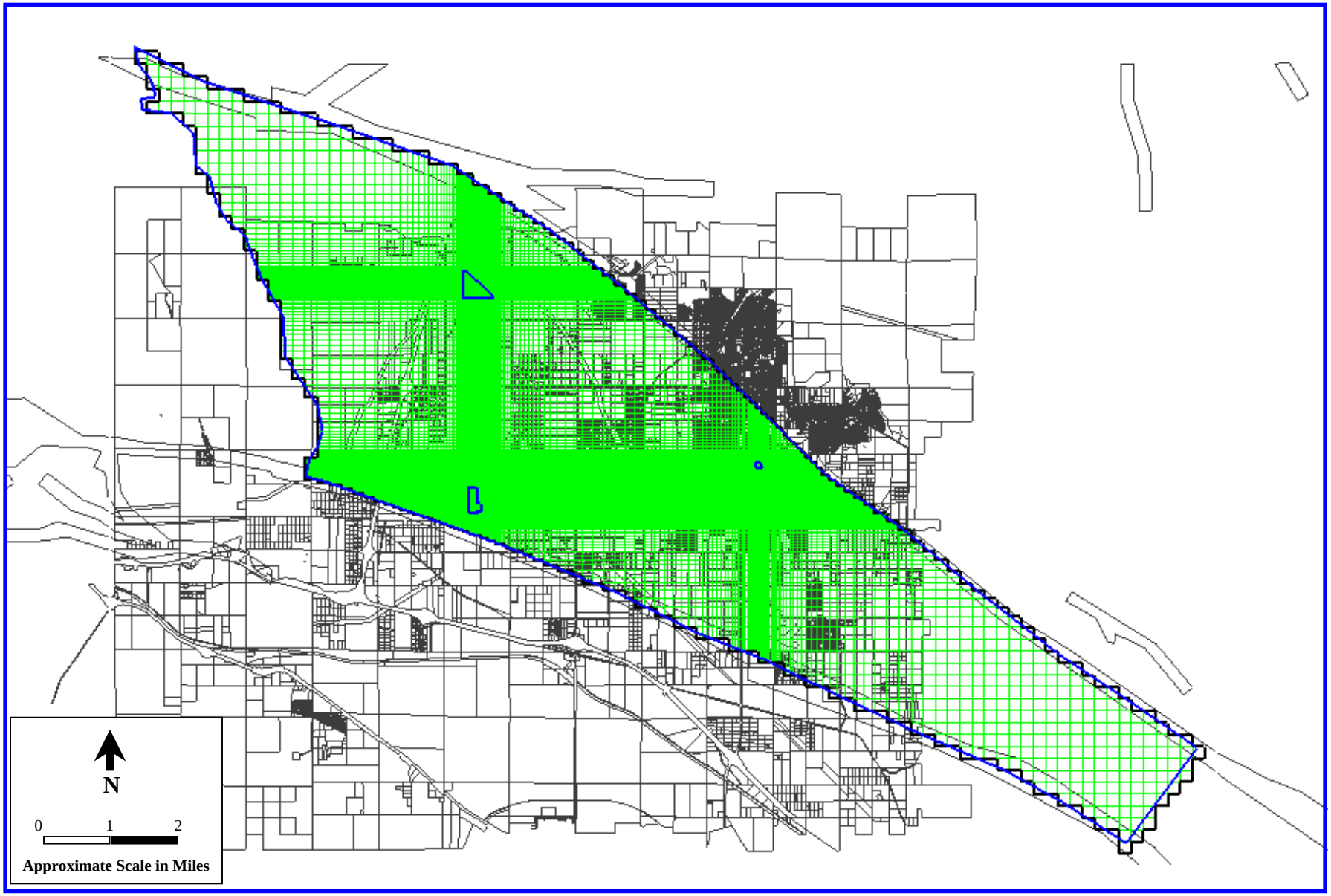

Figure 3: Finite-Difference Discretization

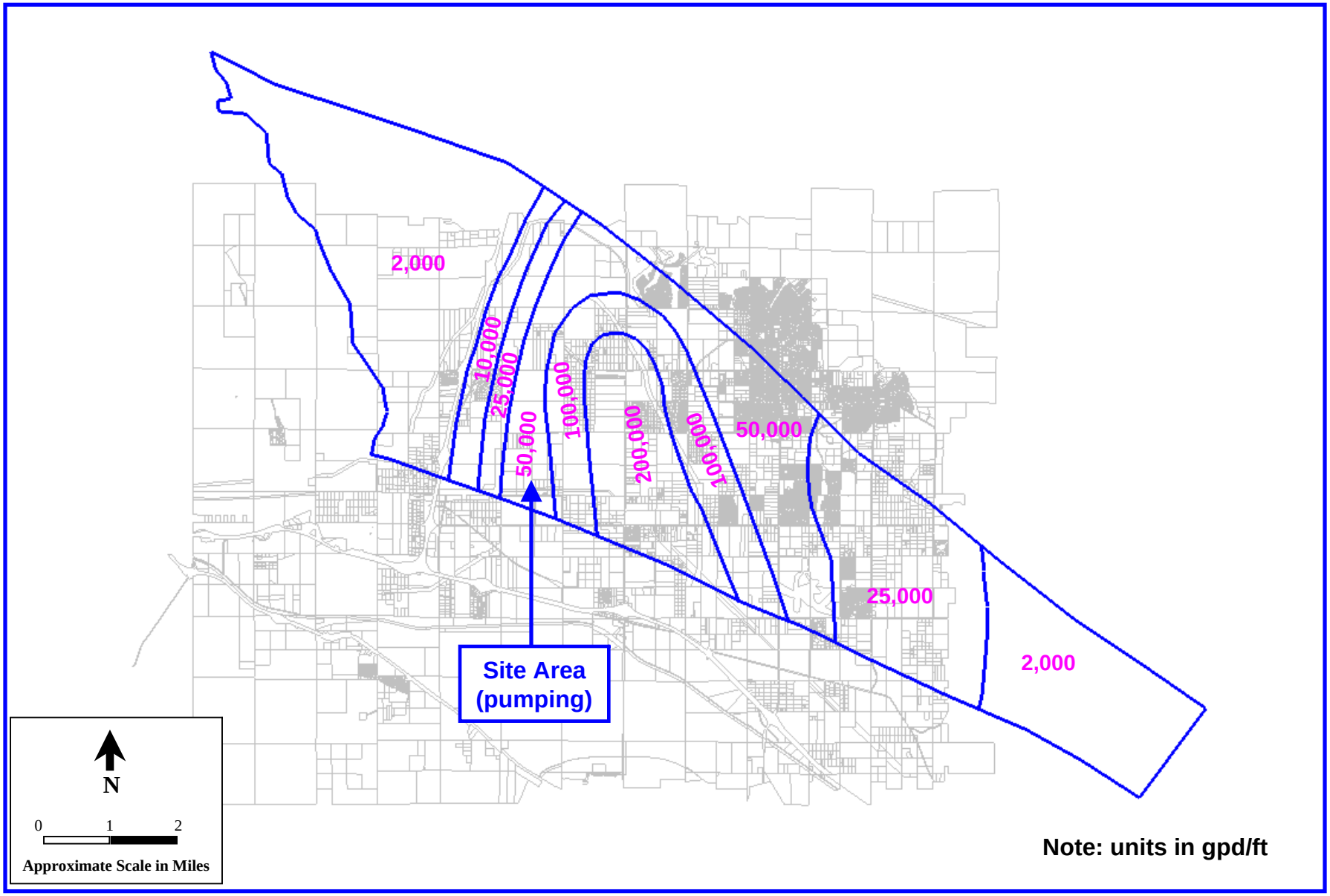

Figure 4: Transmissivity Distribution Used in Groundwater Flow Model

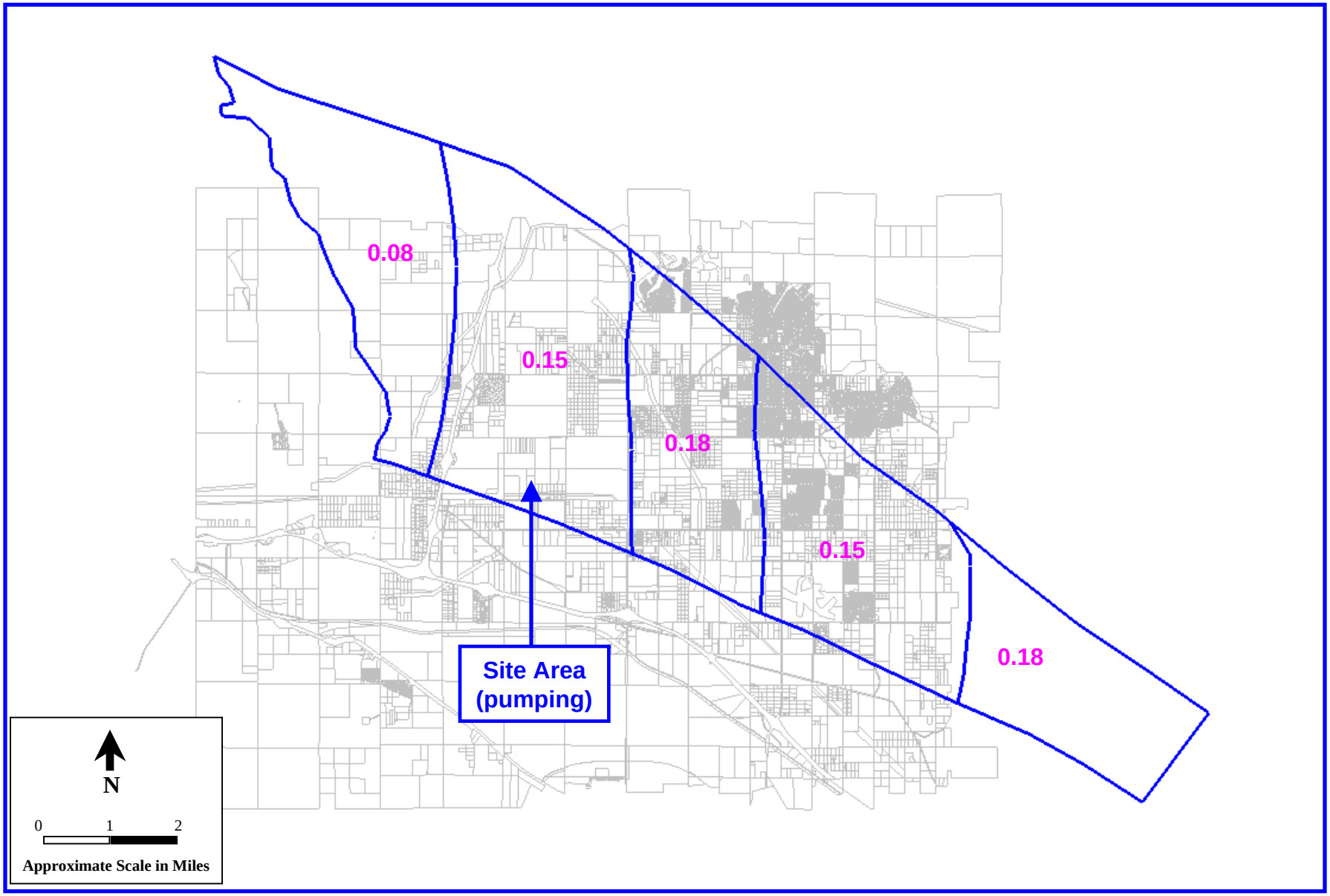

Figure 5: Specific Yield Distribution Used in Groundwater Flow Model

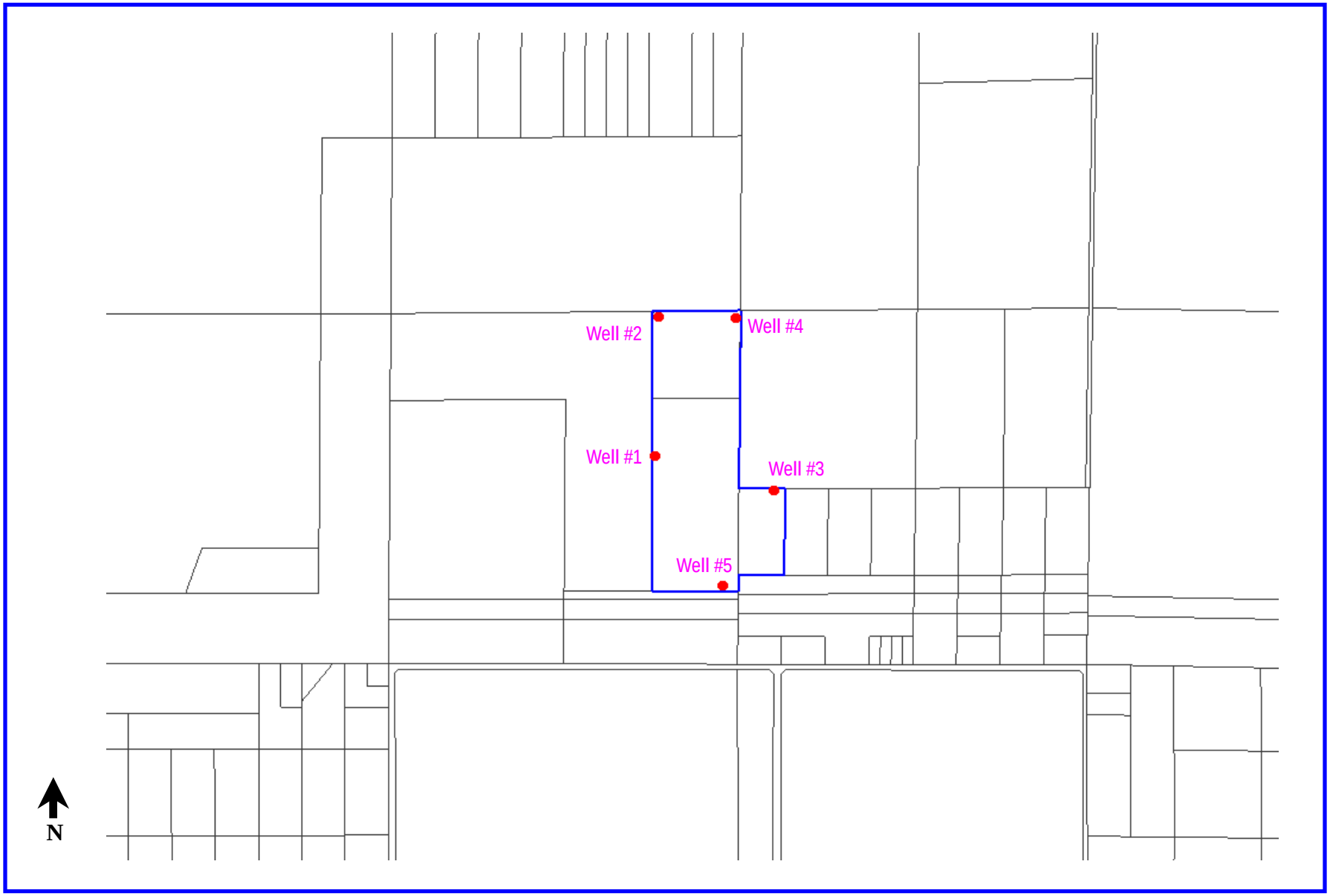

Figure 6: Pumping Well Locations at the Site

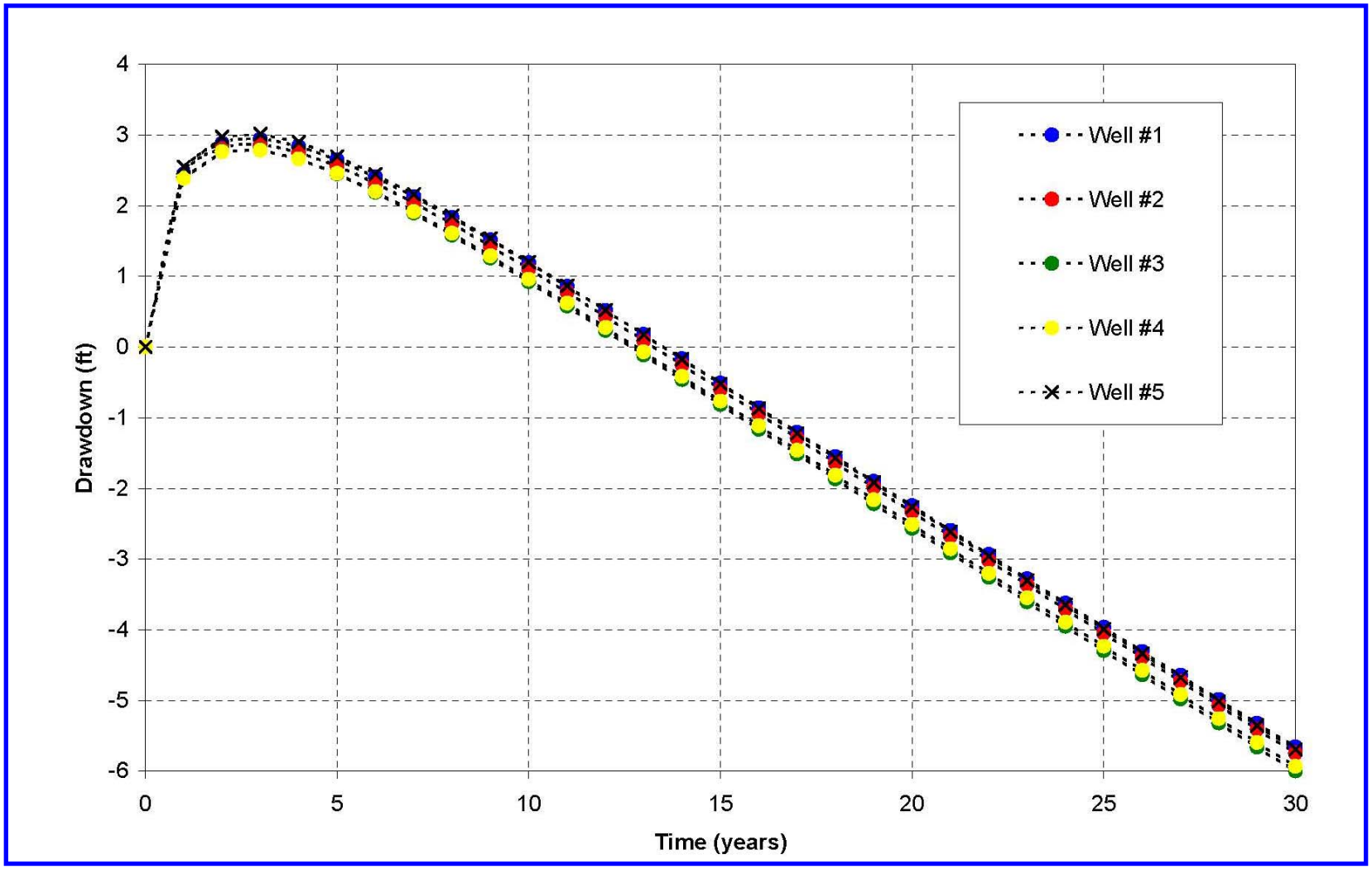

Figure 7: Drawdown Versus Time at Pumping Wells – Scenario A, 5 Wells

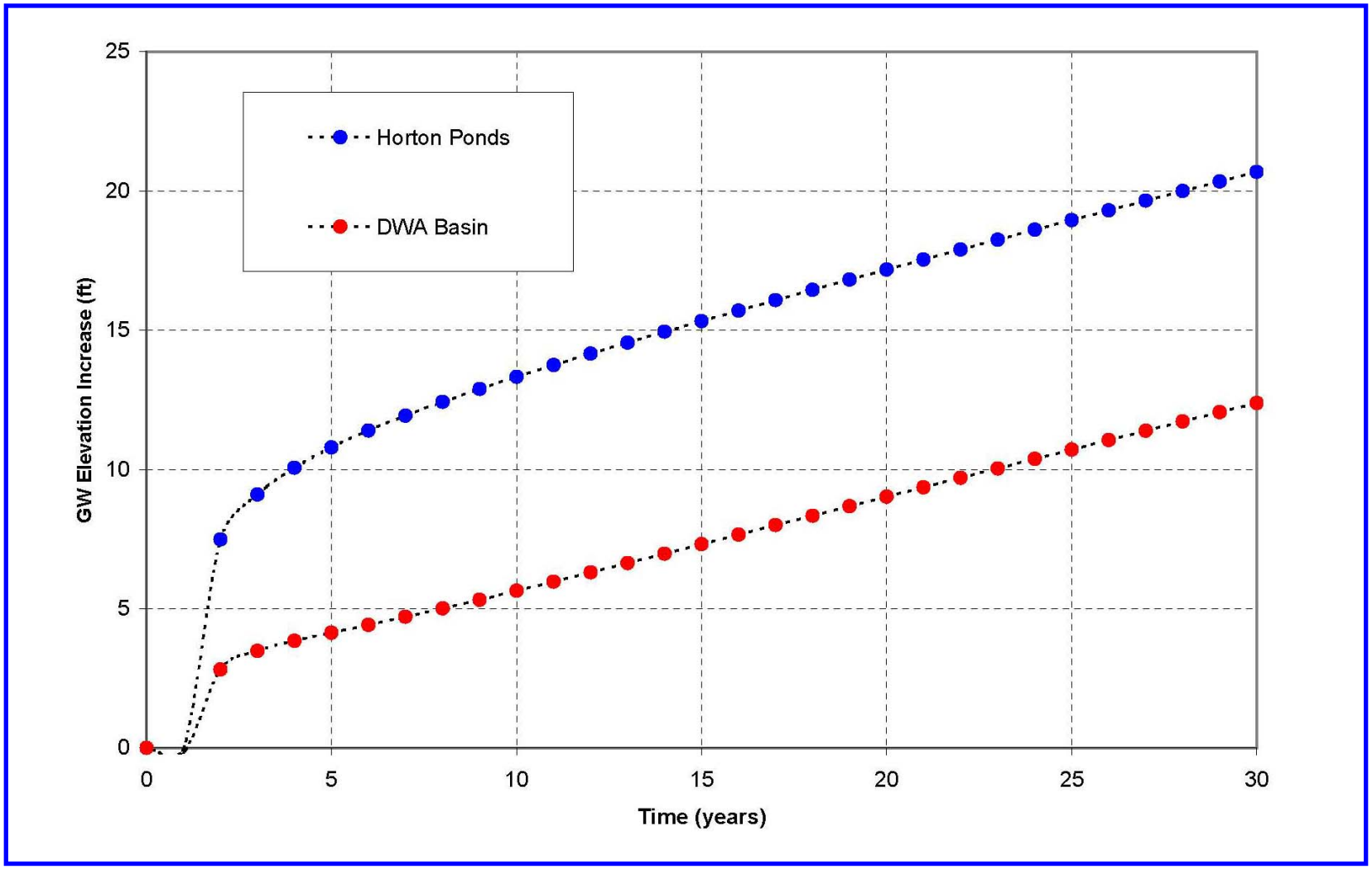

Figure 8: Groundwater Elevation Increases at Surface Basins – Scenario A, 5 Wells

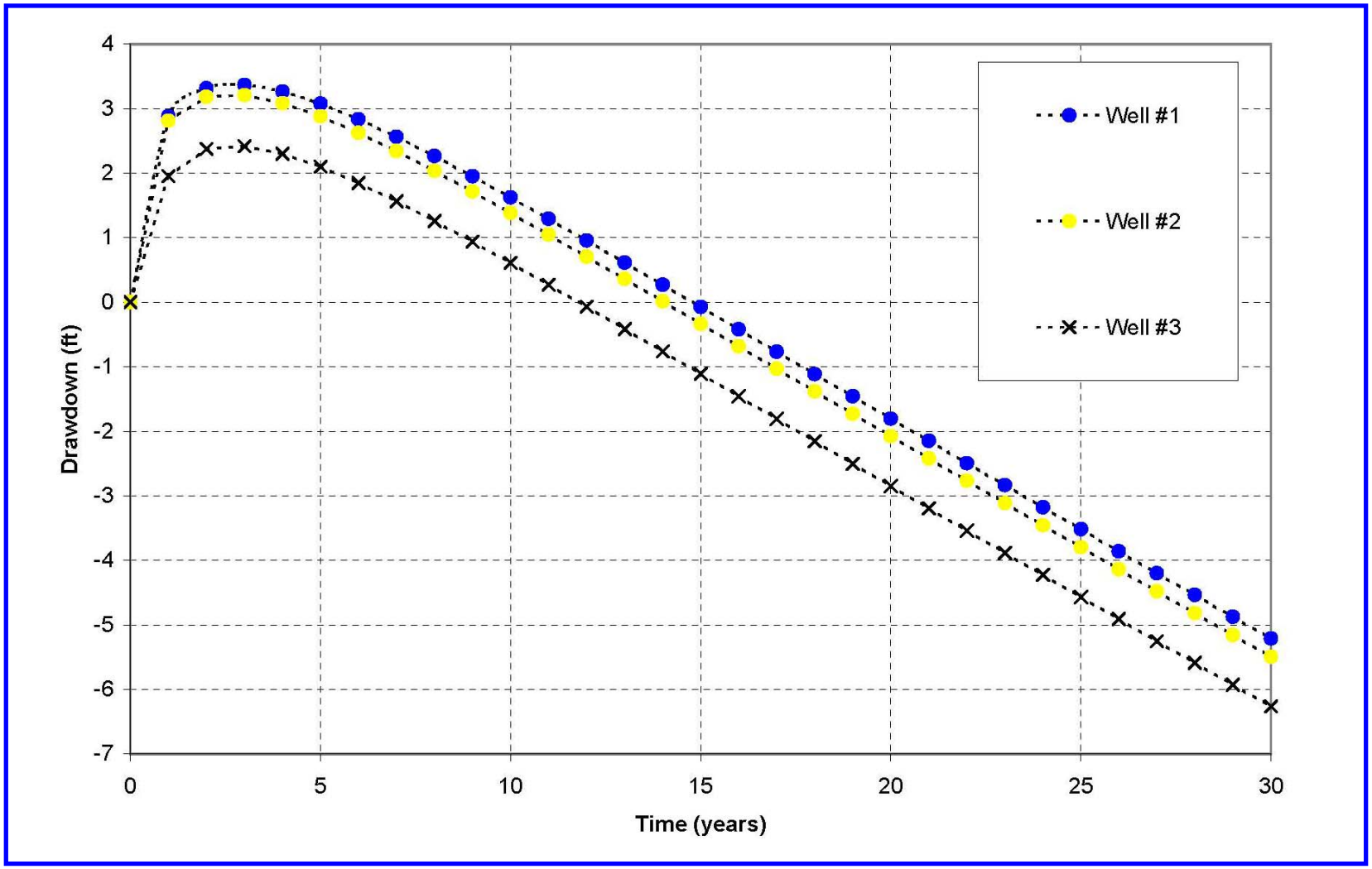

Figure 9: Drawdown Versus Time at Pumping Wells – Scenario A, 3 Wells

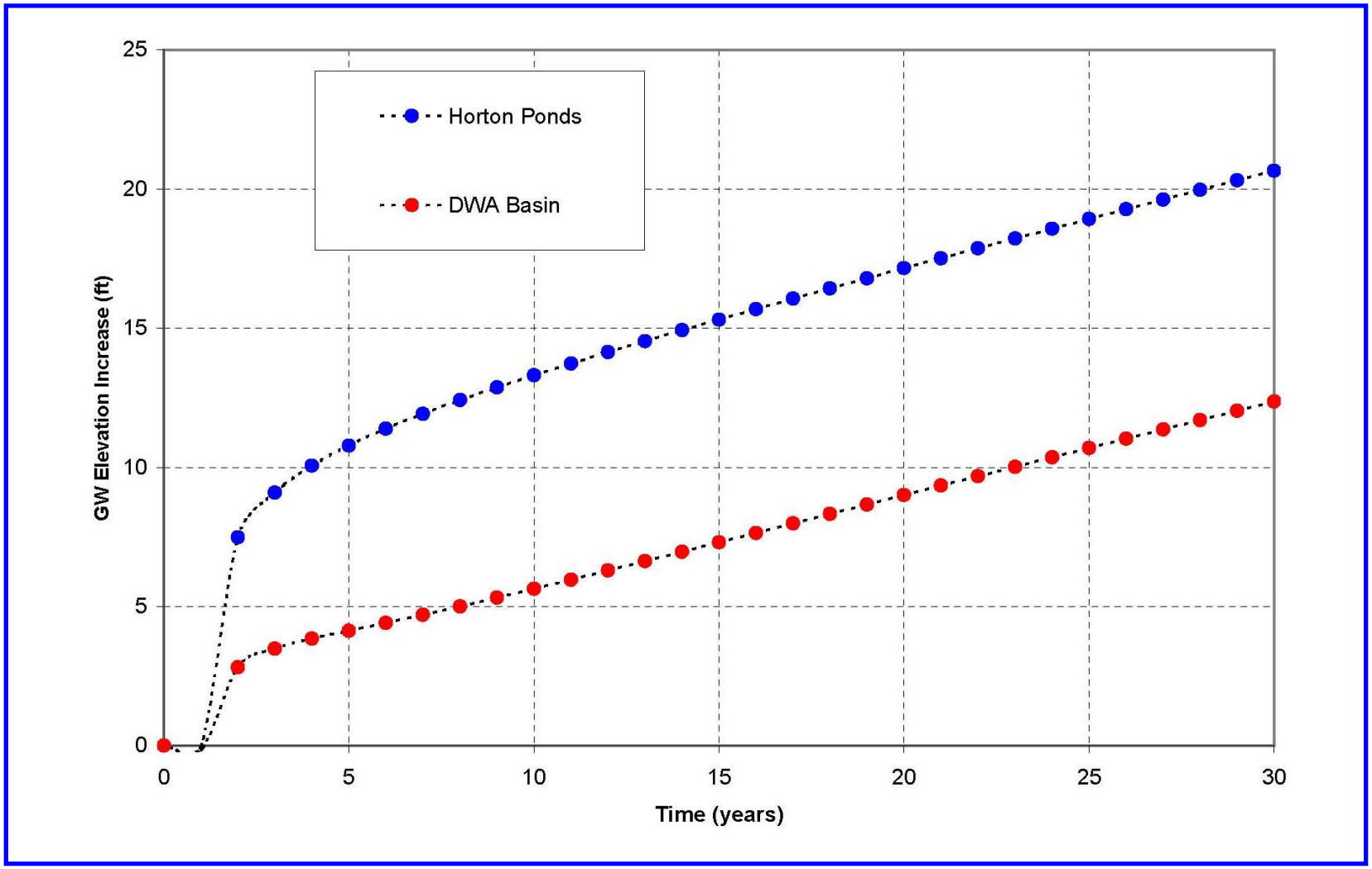

Figure 10: Groundwater Elevation Increases at Surface Basins – Scenario A, 3 Wells

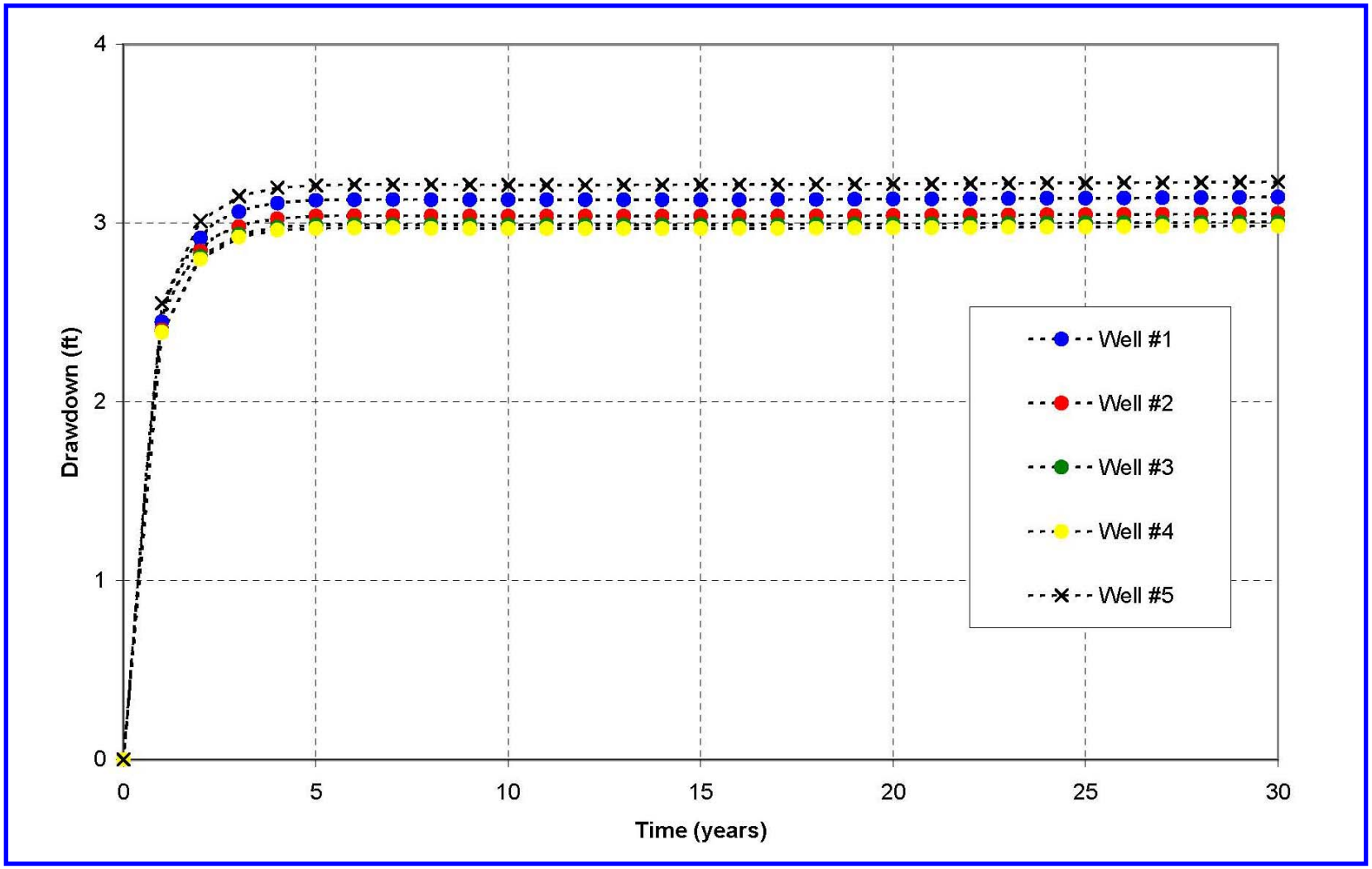

Figure 11: Drawdown Versus Time at Pumping Wells – Scenario B, 5 Wells

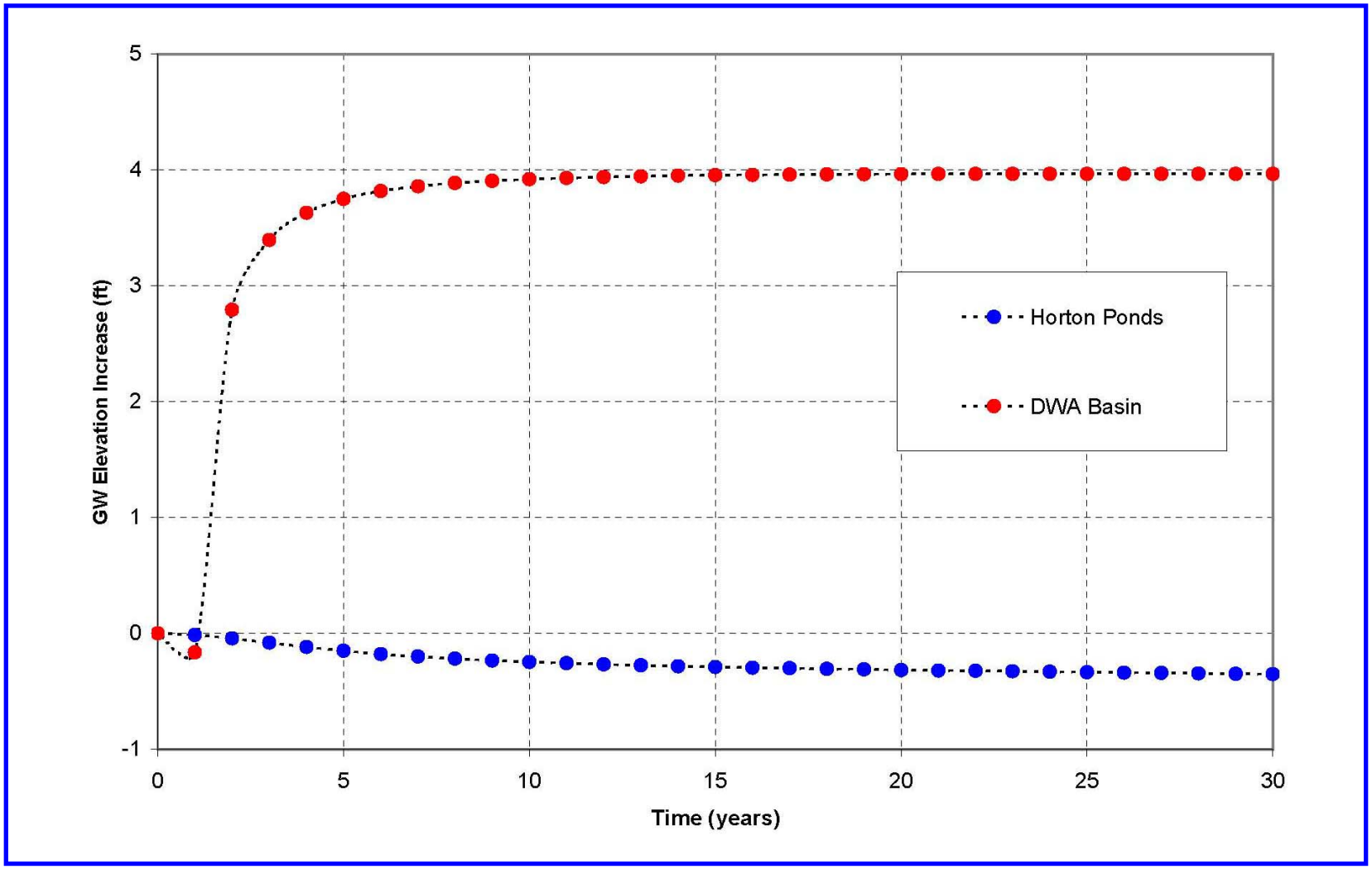

Figure 12: Groundwater Elevation Increases at Surface Basins – Scenario B, 5 Wells

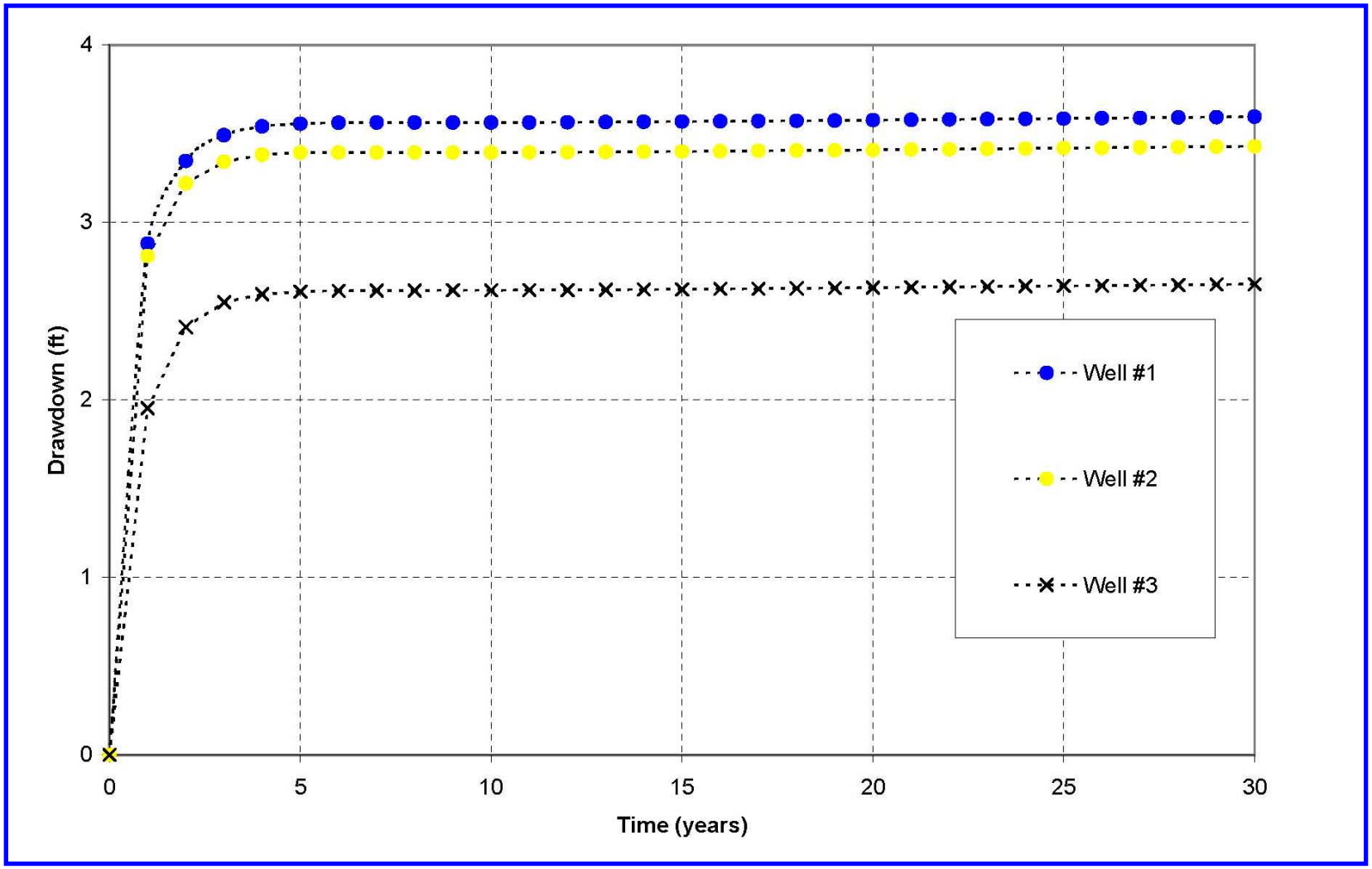

Figure 13: Drawdown Versus Time at Pumping Wells – Scenario B, 3 Wells

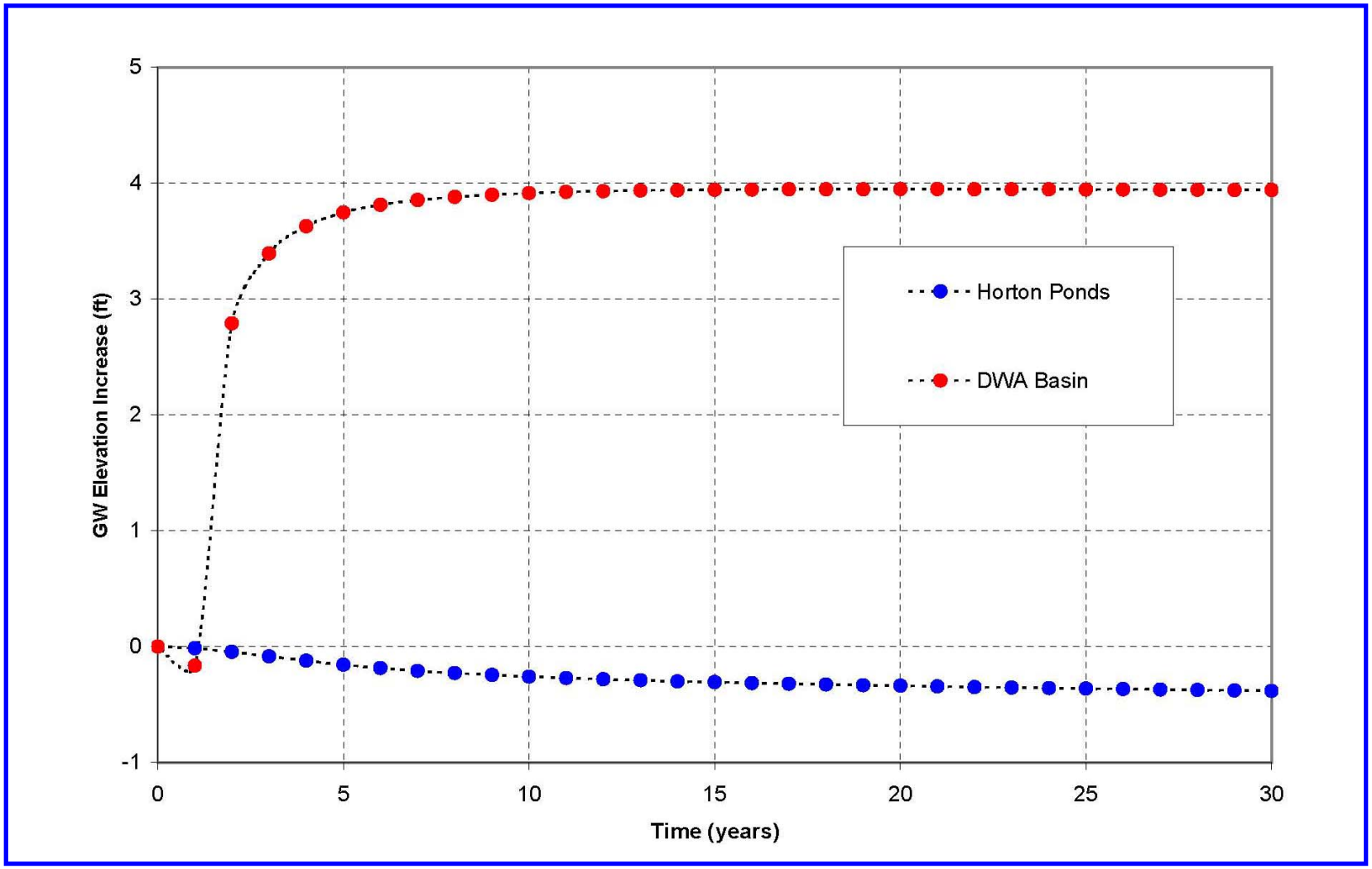

Figure 14: Groundwater Elevation Increases at Surface Basins – Scenario B, 3 Wells

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APPENDIX A

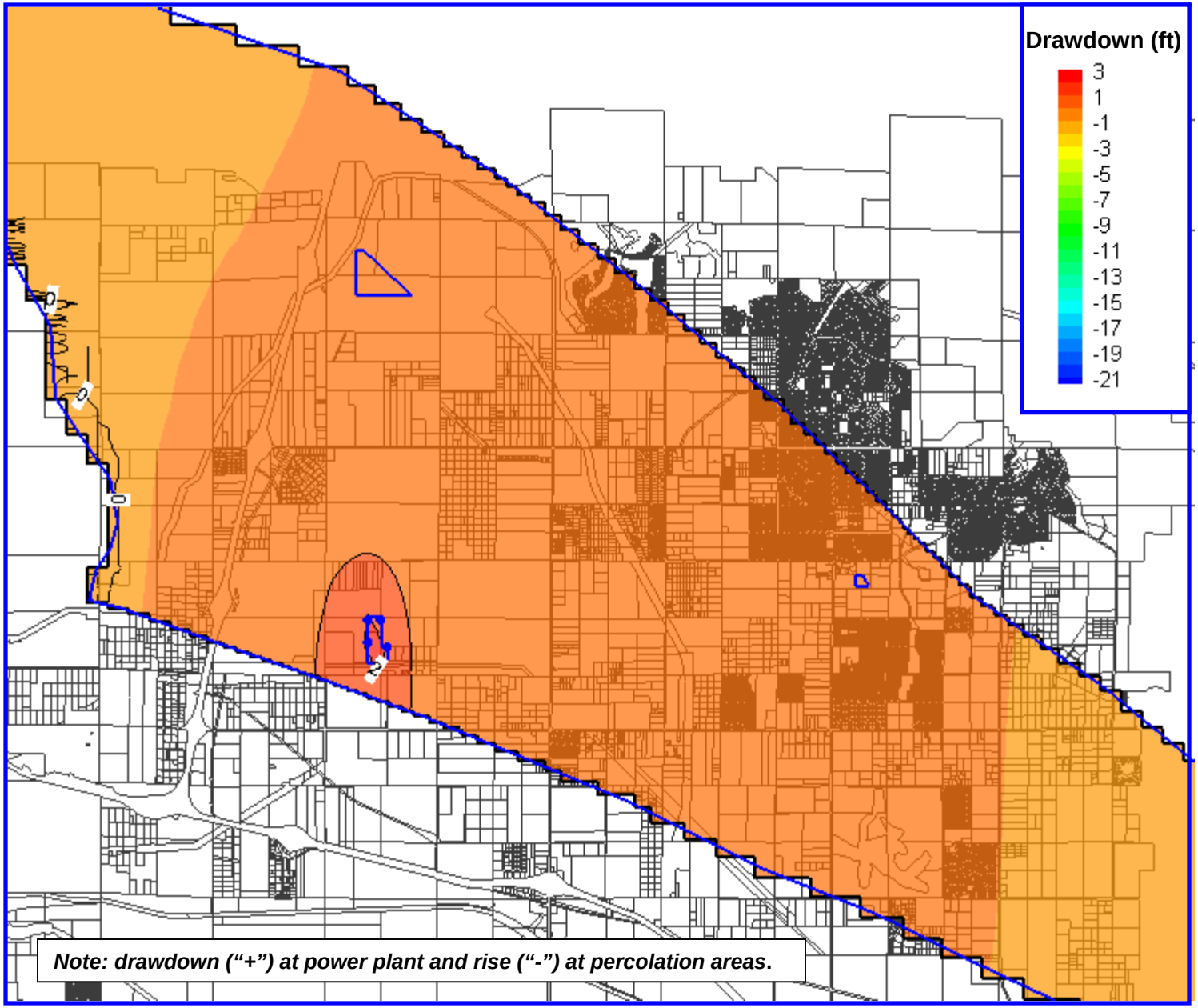

Figure A-1: Simulated Water Level Contours at 1 year – Scenario A, 5 Wells

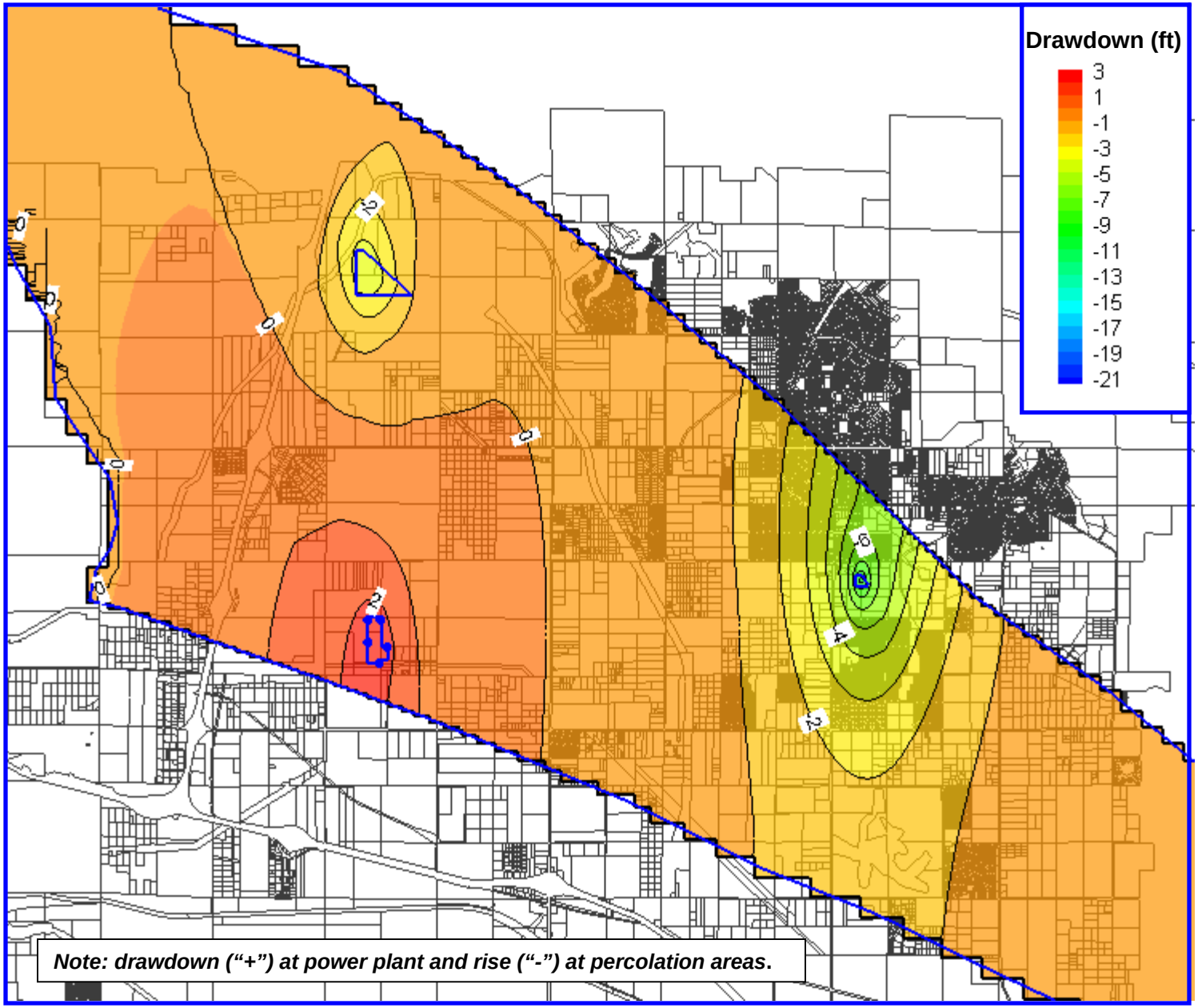

Figure A-2: Simulated Water Level Contours at 3 years – Scenario A, 5 Wells

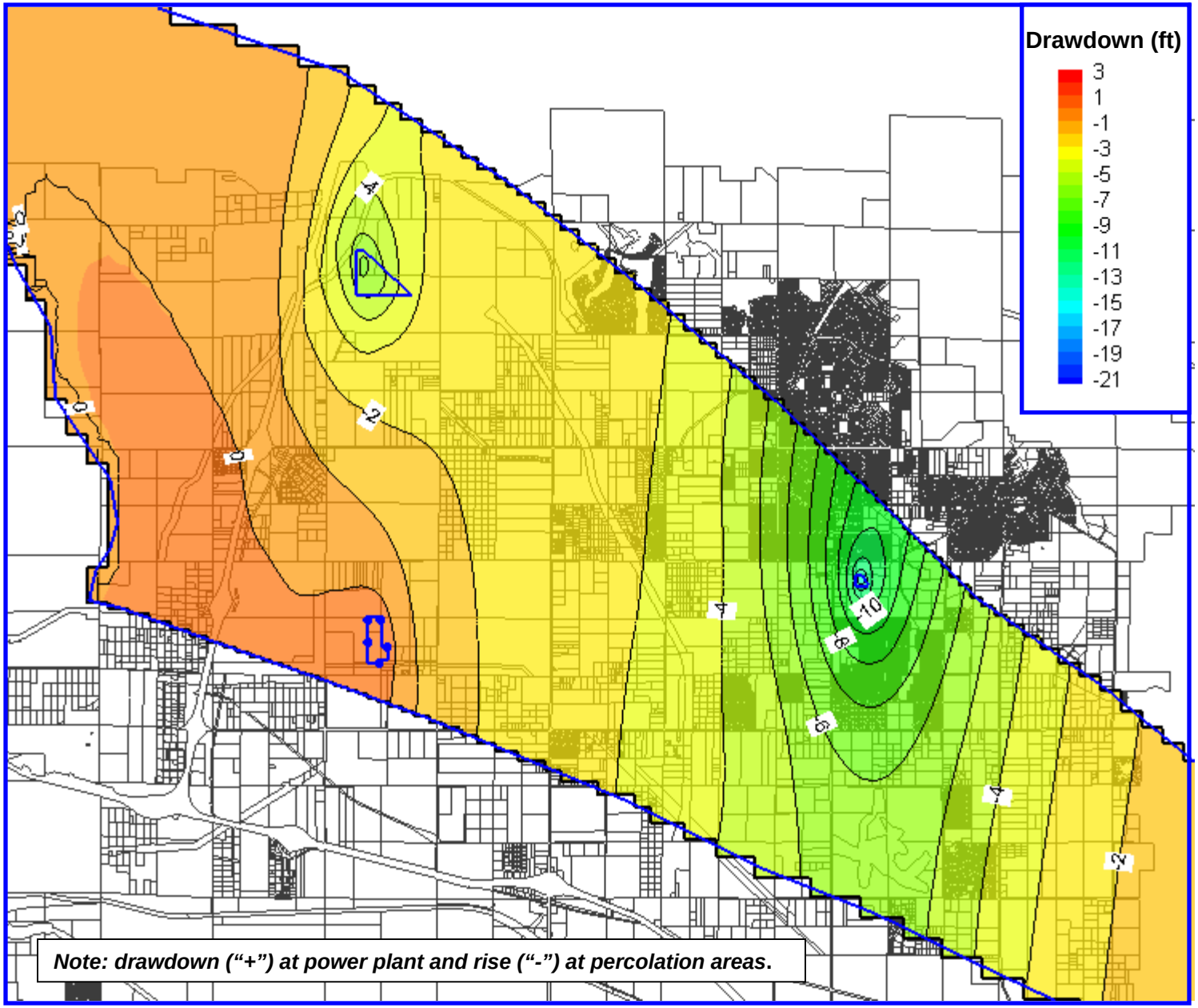

Figure A-3: Simulated Water Level Contours at 10 years – Scenario A, 5 Wells

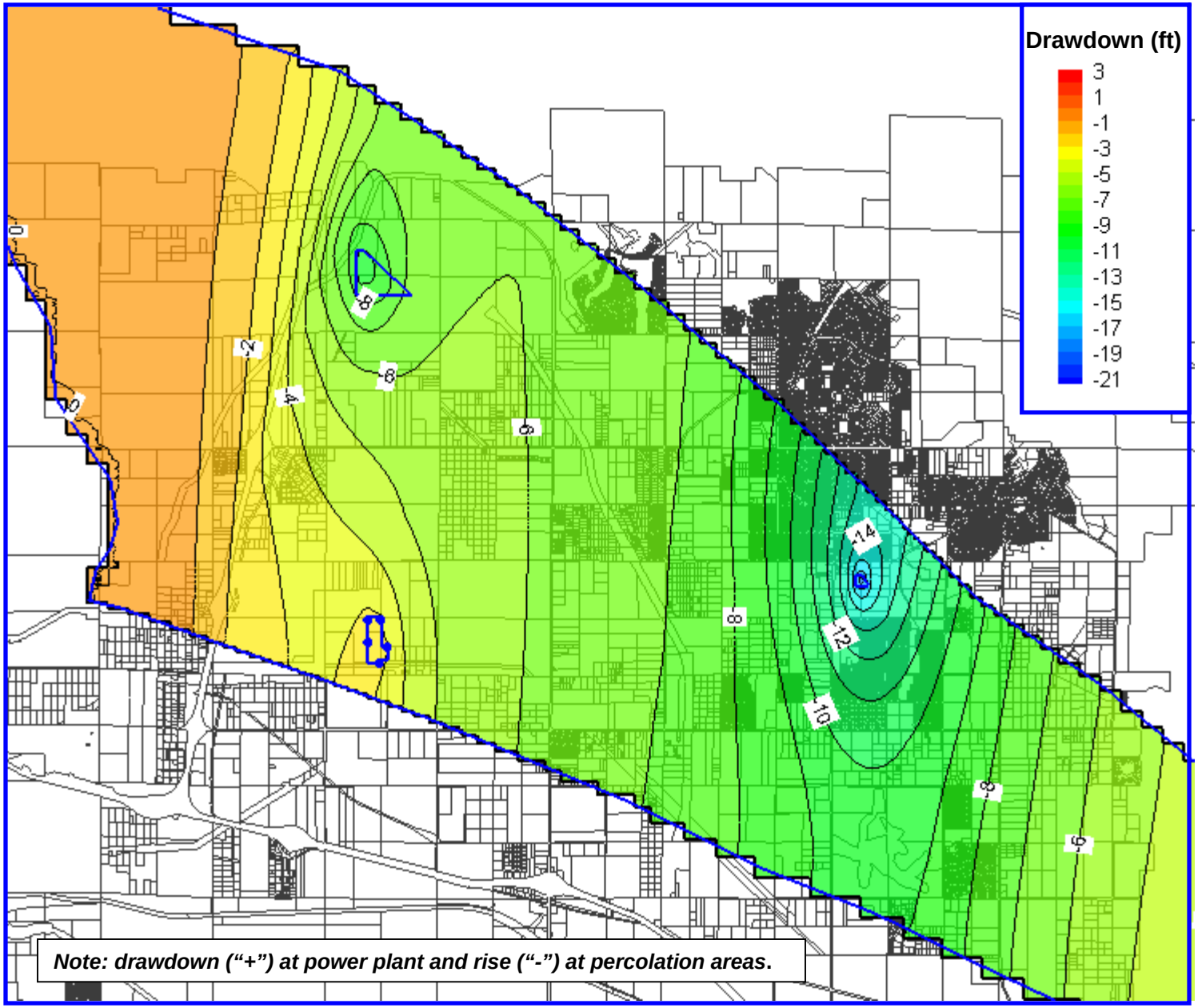

Figure A-4: Simulated Water Level Contours at 20 years – Scenario A, 5 Wells

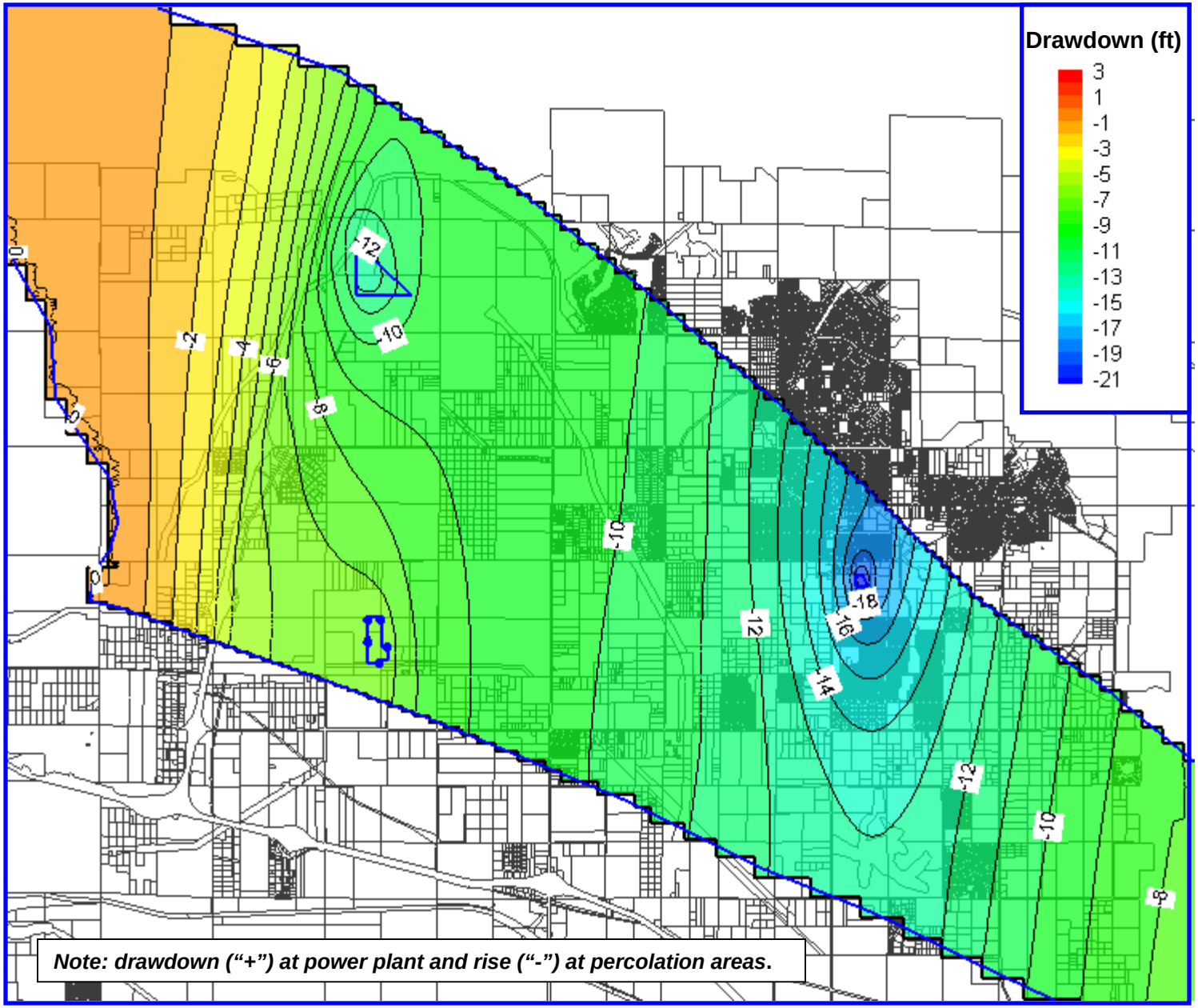

Figure A-5: Simulated Water Level Contours at 30 years – Scenario A, 5 Wells

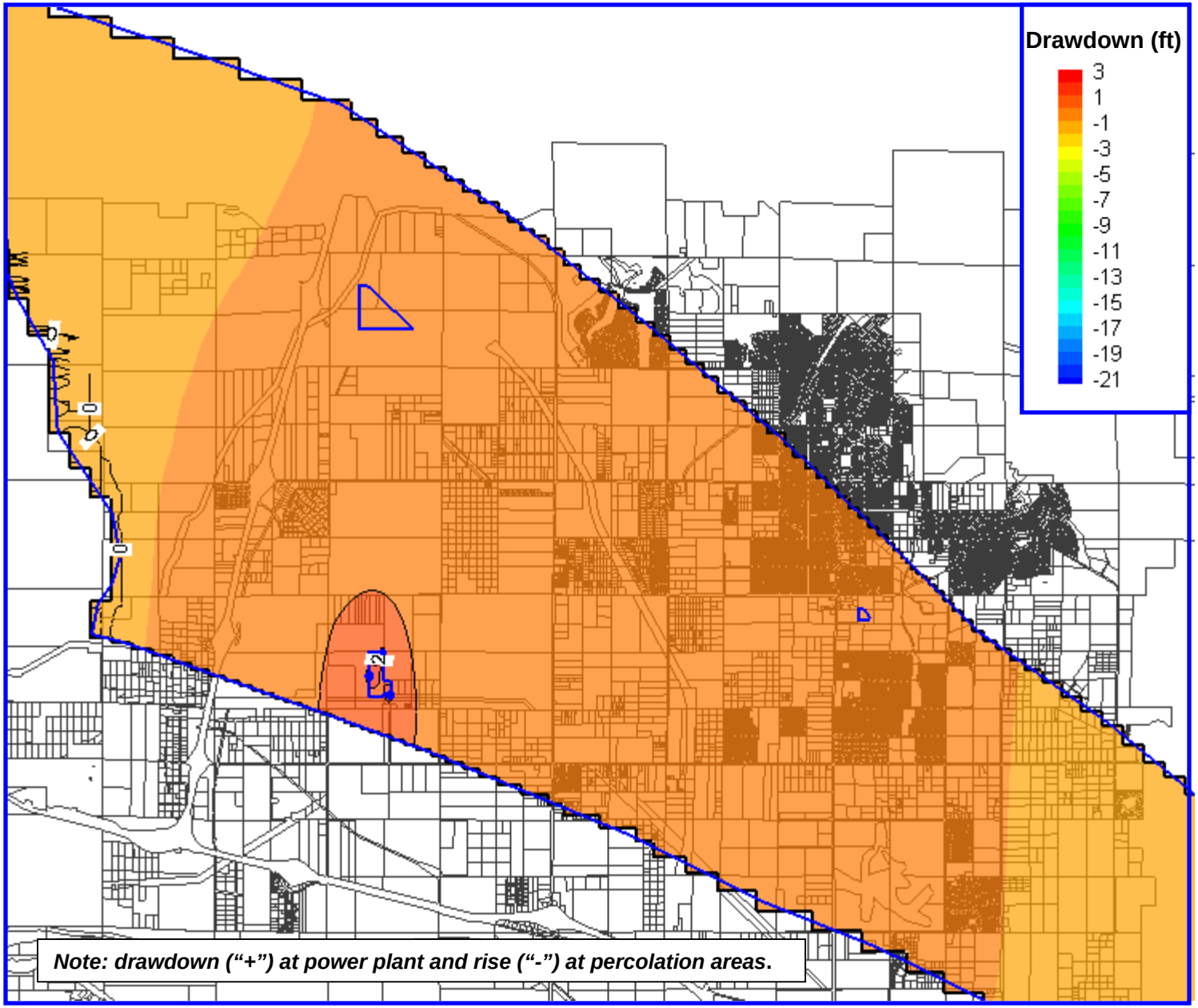

Figure A-6: Simulated Water Level Contours at 1 year – Scenario A, 3 Wells

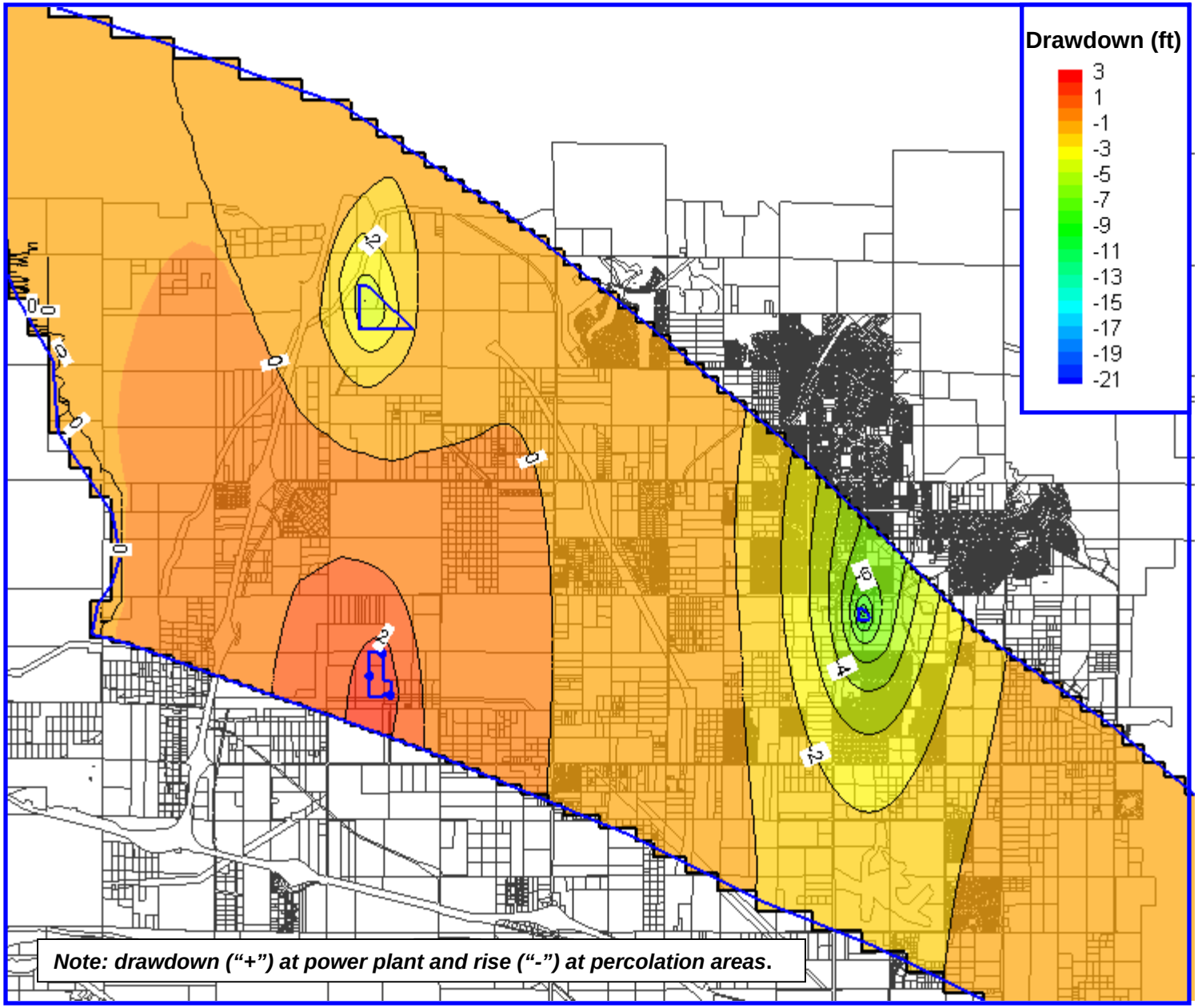

Figure A-7: Simulated Water Level Contours at 3 years – Scenario A, 3 Wells

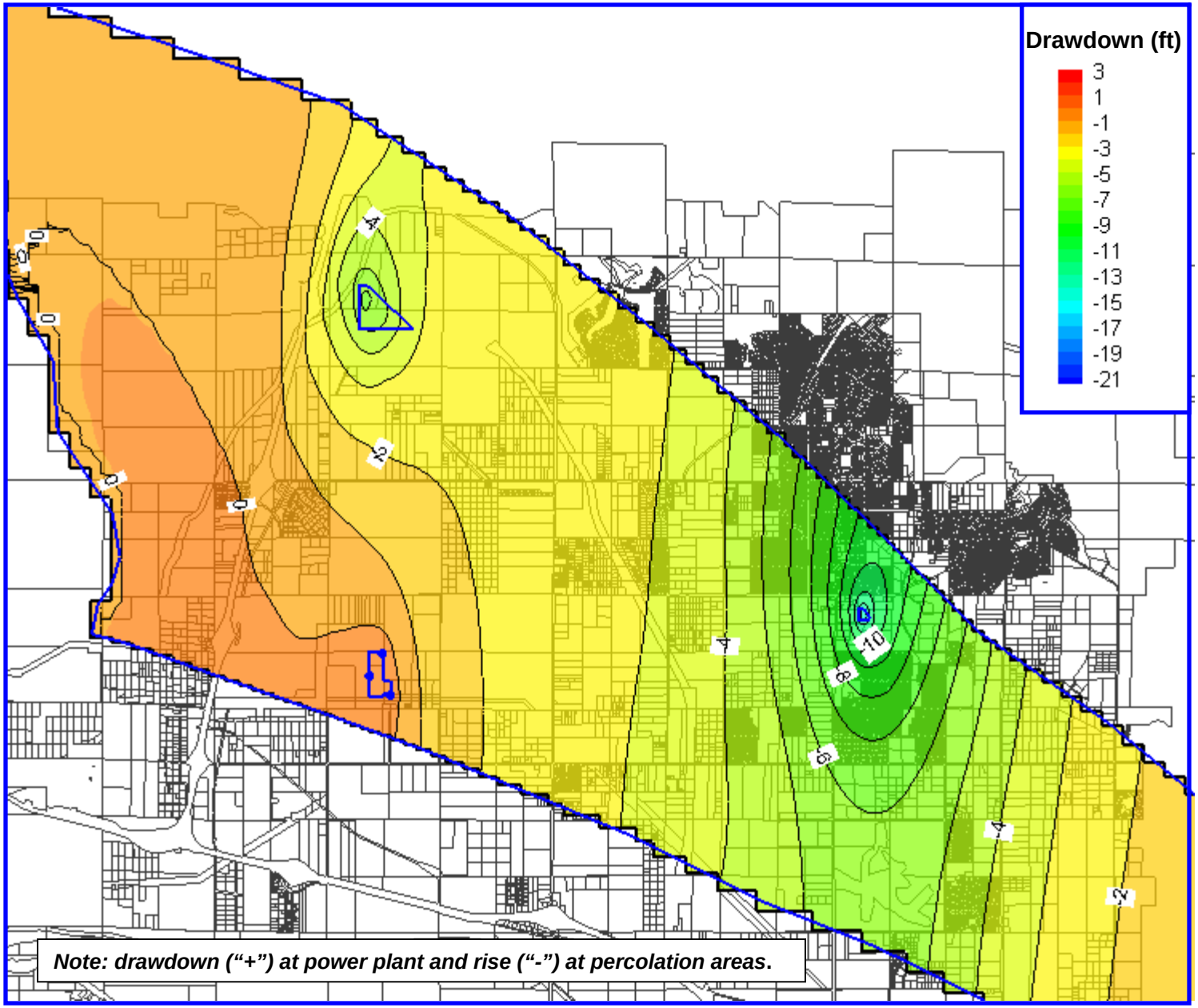

Figure A-8: Simulated Water Level Contours at 10 years – Scenario A, 3 Wells

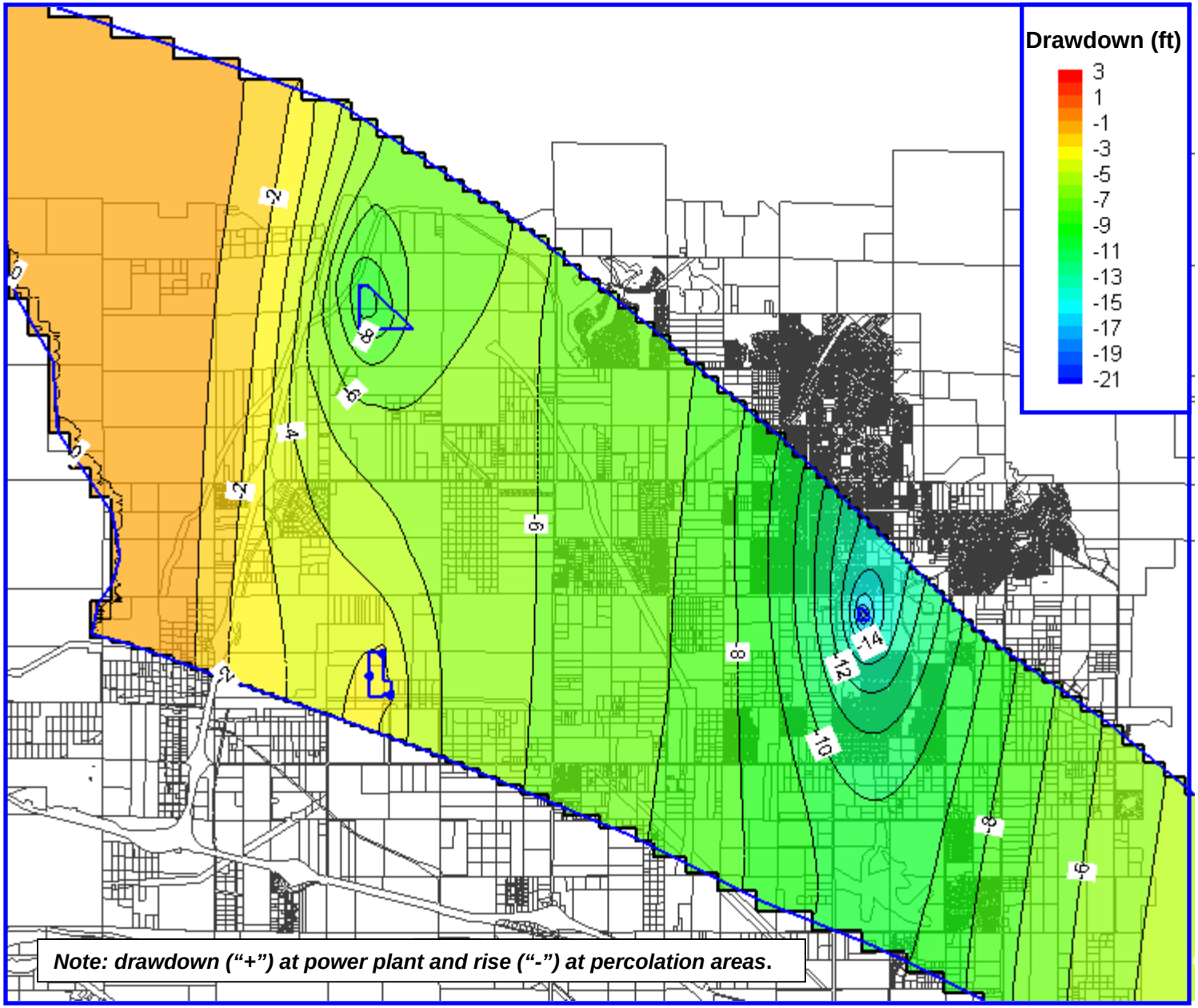

Figure A-9: Simulated Water Level Contours at 20 years – Scenario A, 3 Wells

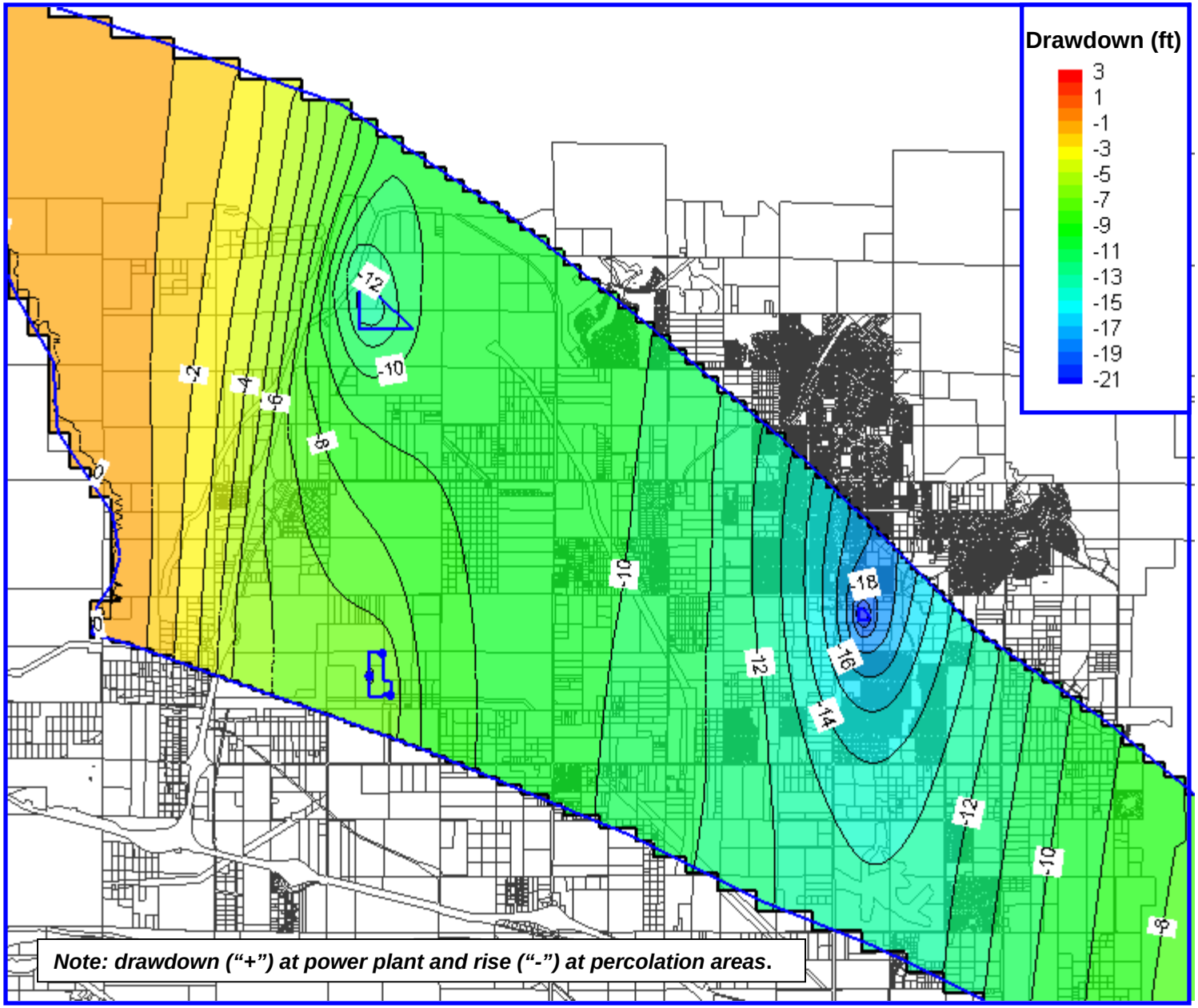

Figure A-10: Simulated Water Level Contours at 30 years – Scenario A, 3 Wells

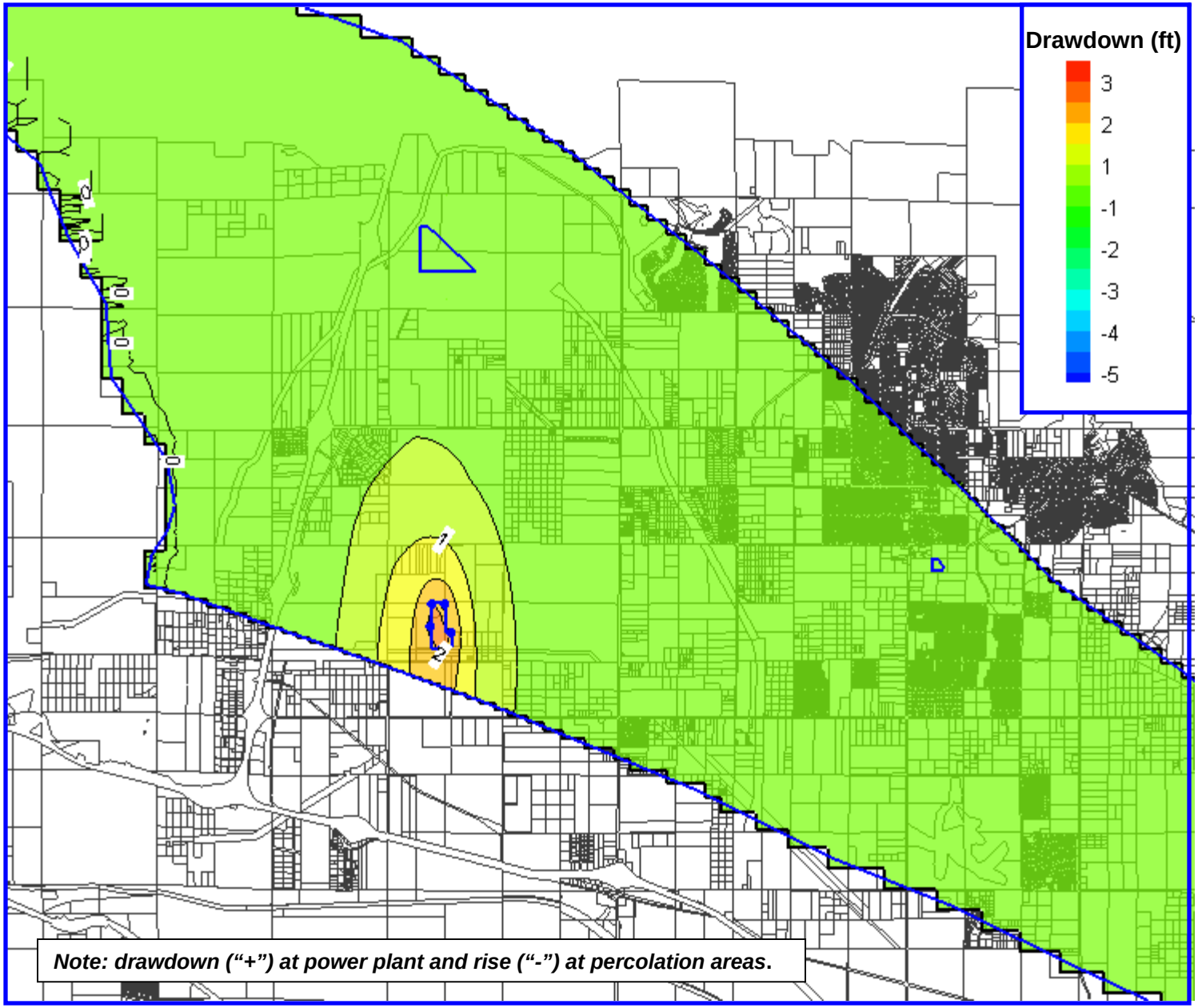

Figure A-11: Simulated Water Level Contours at 1 year – Scenario B, 5 Wells

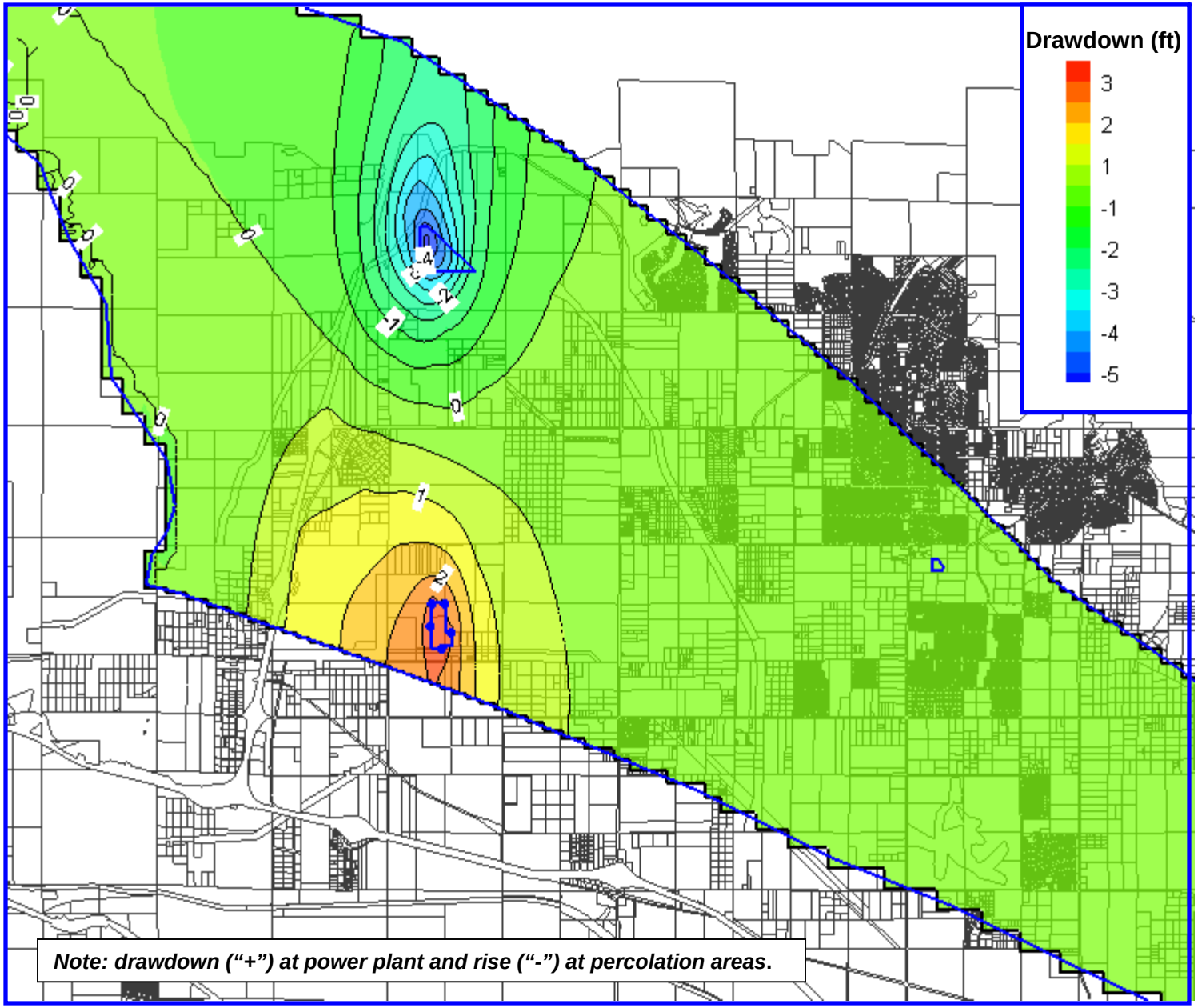

Figure A-12: Simulated Water Level Contours at 10 years – Scenario B, 5 Wells

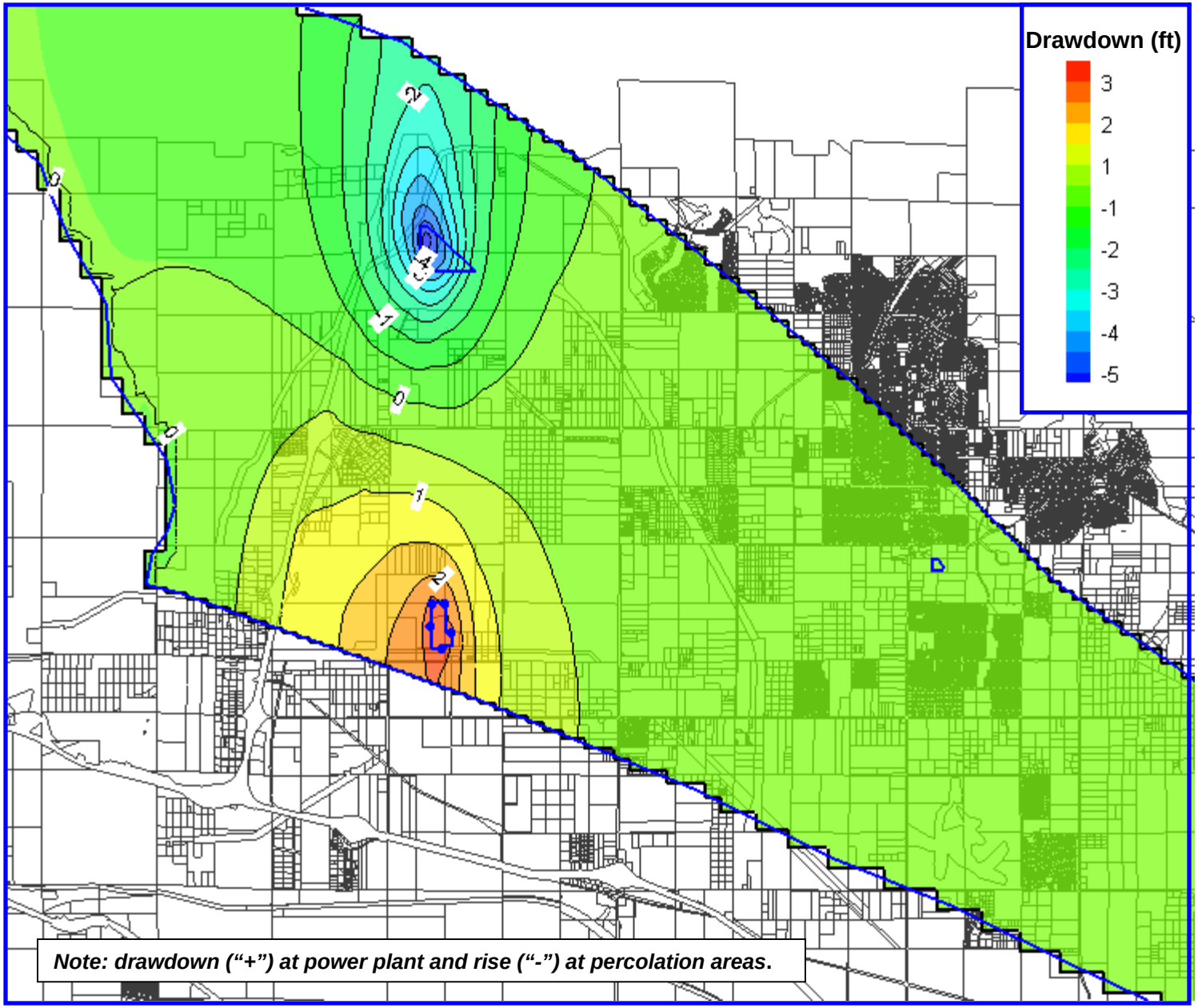

Figure A-13: Simulated Water Level Contours at 20 years – Scenario B, 5 Wells

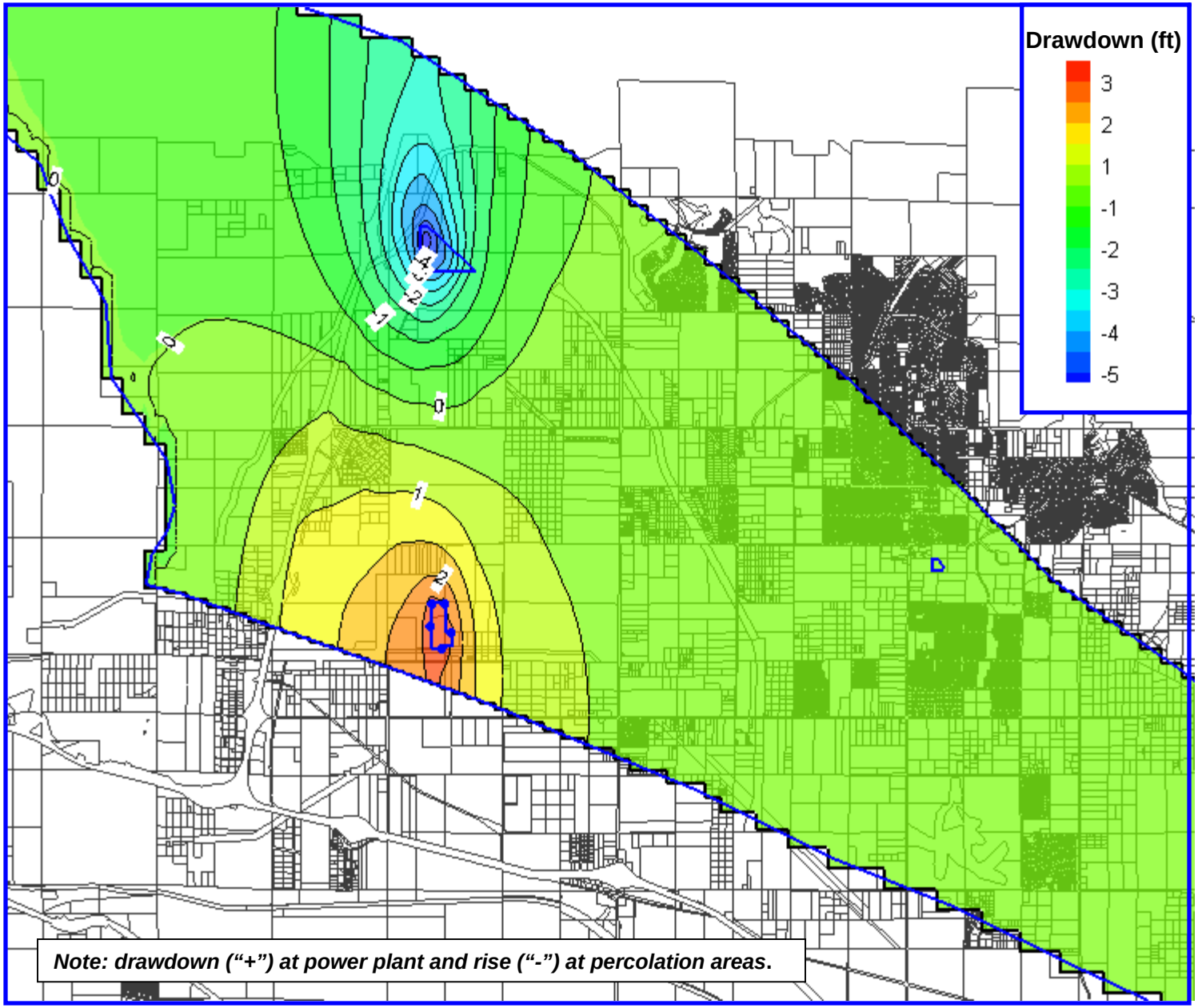

Figure A-14: Simulated Water Level Contours at 30 years – Scenario B, 5 Wells

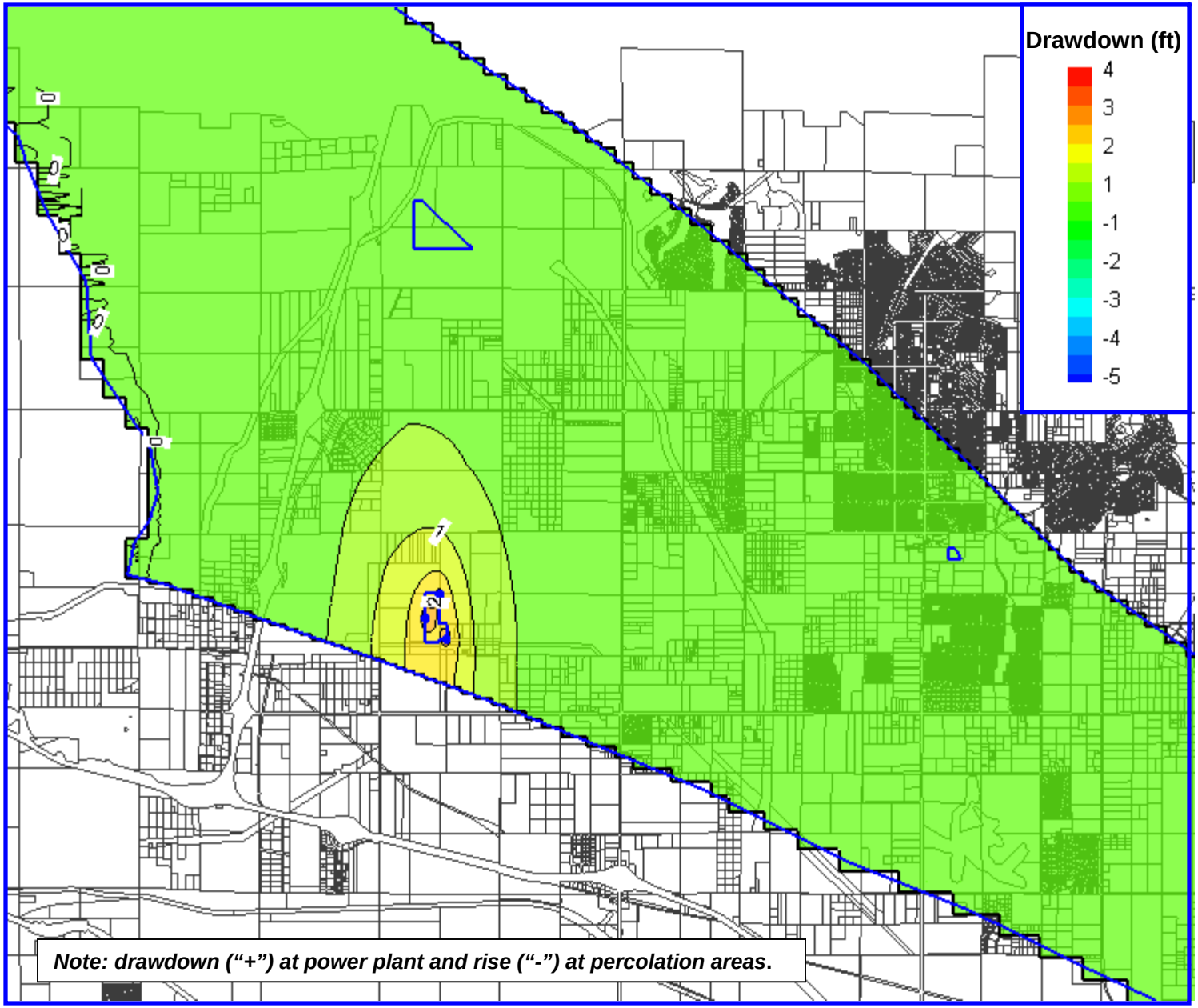

Figure A-15: Simulated Water Level Contours at 1 year – Scenario B, 3 Wells

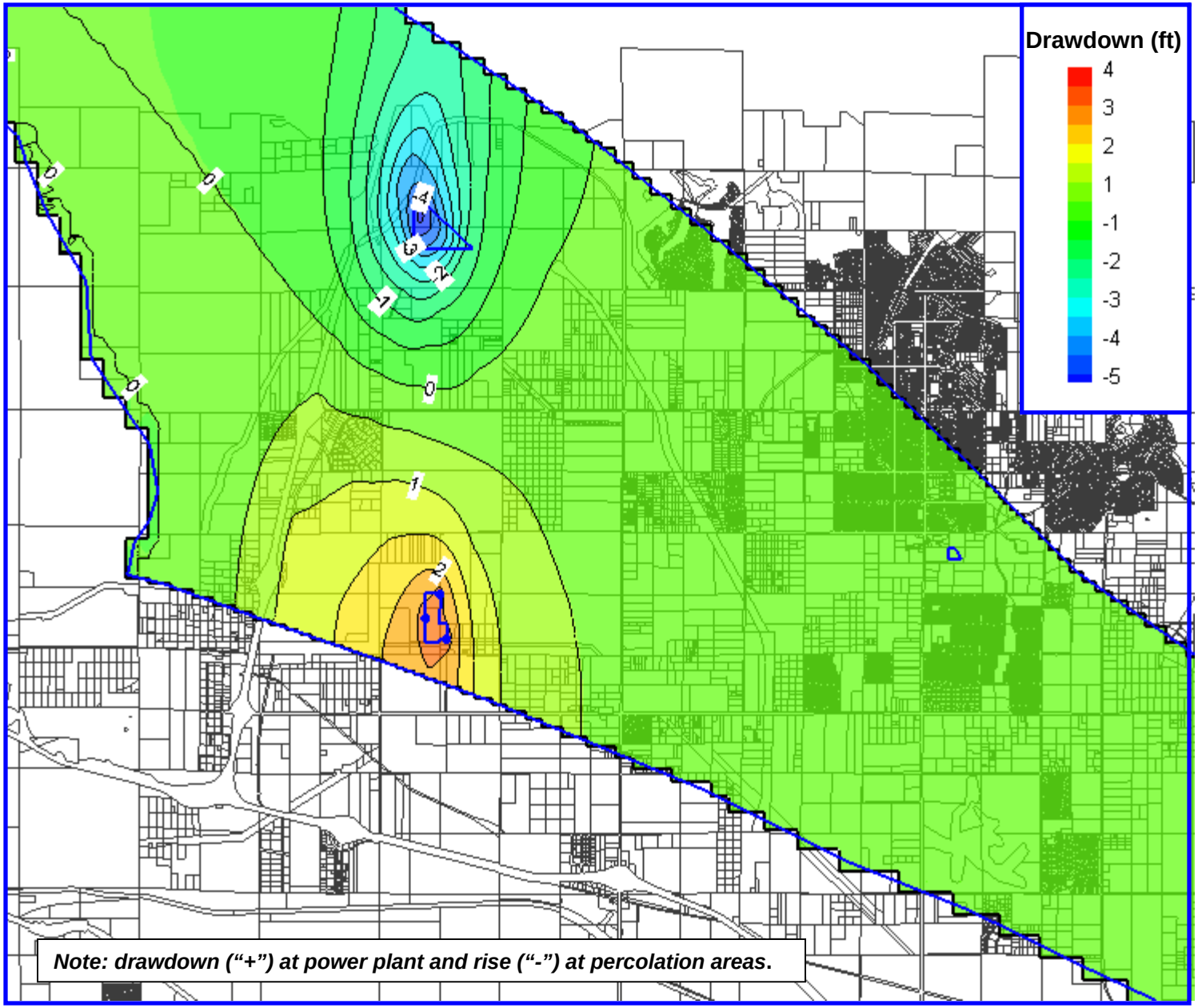

Figure A-16: Simulated Water Level Contours at 10 years – Scenario B, 3 Wells

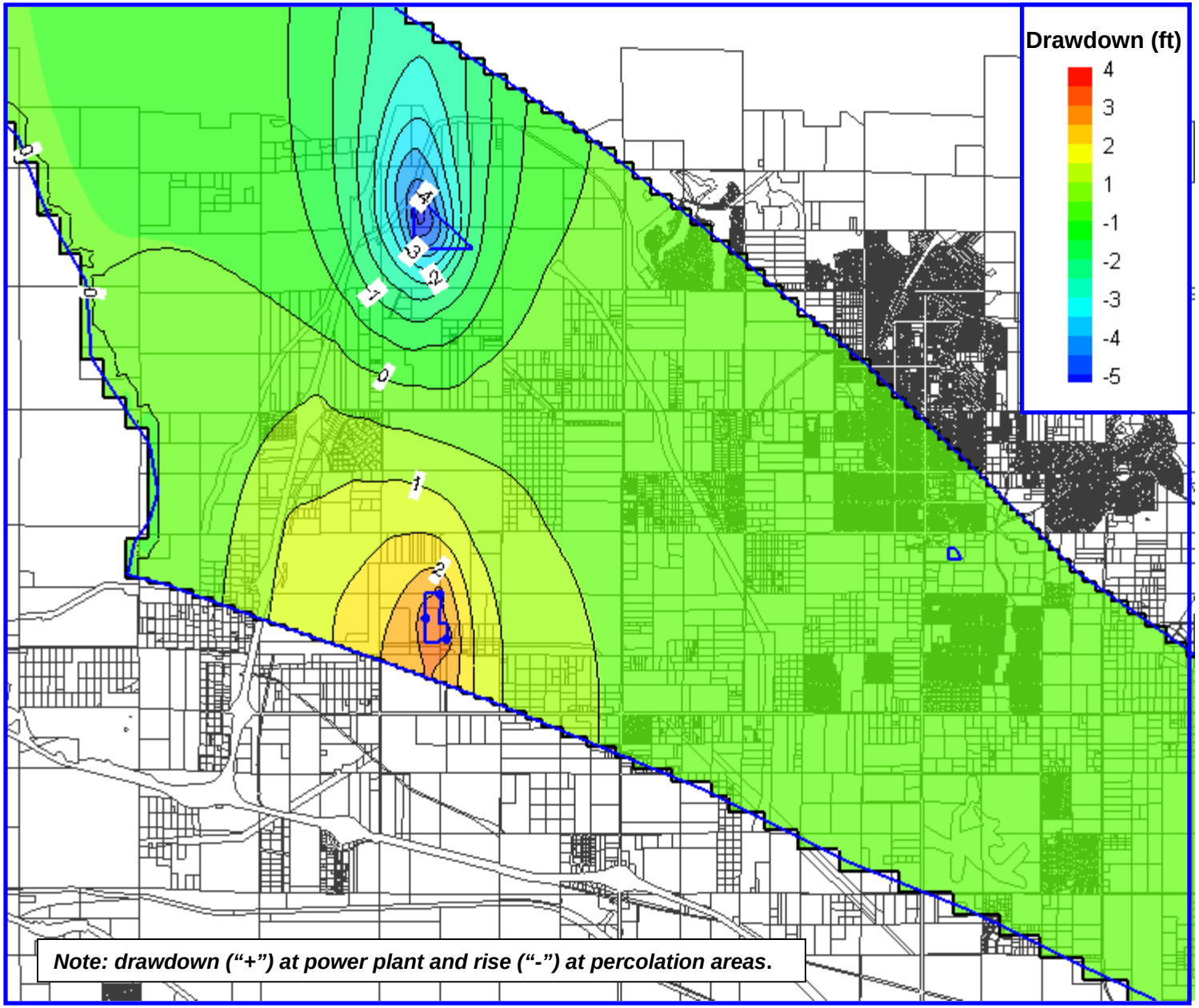

Figure A-17: Simulated Water Level Contours at 20 years – Scenario B, 3 Wells

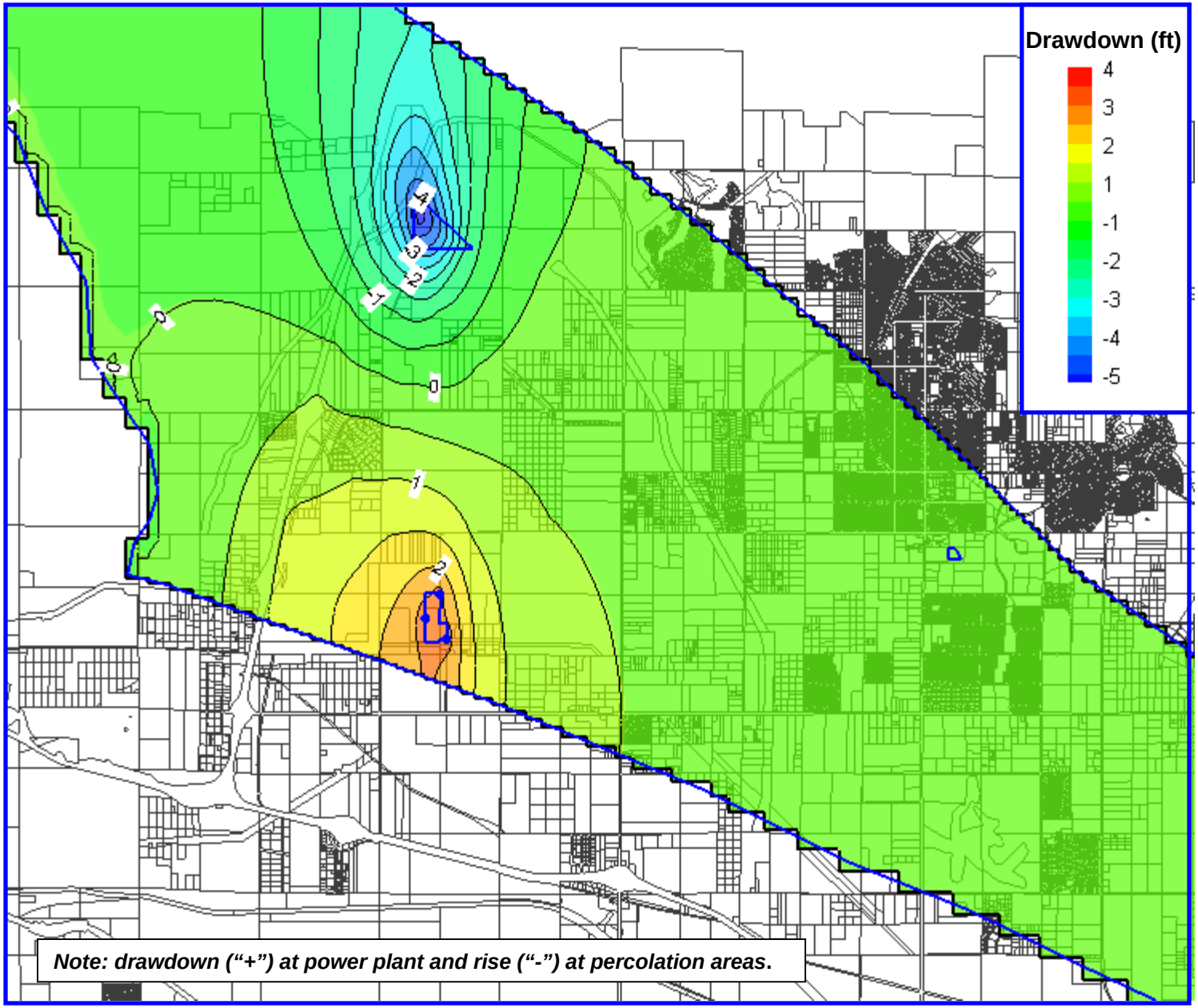

Figure A-18: Simulated Water Level Contours at 30 years – Scenario B, 3 Wells

APPENDIX R-2
HYDROLOGY REPORT

Sentinel Power Station

County of Riverside, Ca.

HYDROLOGY REPORT

PREPARED BY:

STANTEC CONSULTING INC.
73-733 FRED WARING DRIVE
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PALM DESERT, CA 92260
760.346.9844

Stantec

stantec.com

PREPARED FOR:

CPV Sentinel, Inc.

June 8, 2007
Project Number 2016105300.200

Sentinel Power Station

County of Riverside, Ca.

HYDROLOGY REPORT

PREPARED BY:

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PALM DESERT DIVISION
73-733 Fred Waring Dr., SUITE 100
PALM DESERT, CA
92260

Prepared Under the Supervision of:

_____

Dale C. Ross, P.E.
R.C.E. C60595
Expiration Date: Dec 31, 2008

SENTINEL POWER STATION
PRELIMINARY HYDROLOGY REPORT

1. Introduction 4

2. Existing Conditions 4

3. Hydrology and Hydraulics 5

4. Conclusion 5

APPENDIX A

Plate 1 – Vicinity Map

Plate 2 – FIRM Map

Plate D-4.4 – 100-year, 1-hour Precipitation

Plate E-5.2 – 100-year, 3-hour Precipitation
Plate E-5.4 – 100-year, 6-hour Precipitation
Plate E-5.6 – 100-year, 24-hour Precipitation

Preliminary Drainage Map

Hydrologic Calculations

Introduction

The purpose of this report is to provide preliminary on site hydrology calculations in support of the Sentinel Power Station. This report was prepared in accordance with the drainage requirements for the County of Riverside, California.

The Sentinel Power Station project proposes the development of a power station on approximately 22.7 acres with site improvements including grading, unpaved access and parking, and support buildings and equipment. The site is located in a portion of the southwest quarter of Section 4, Township 3 South, Range 4 East, of the San Bernardino Base and Meridian. See Plate 1 for a vicinity map.

Existing Conditions

The site is currently undeveloped and located in undeveloped portions of Riverside County adjacent to unimproved 16th Avenue approximately 1.5 miles east of State Highway 62 in the North Palm Springs area. An existing power station (by others) is within close proximity to the site's northwest corner and has been graded and improved. This existing power station has intercepted and diverted a portion of the offsite flows that previously reached the Sentinel site.

Based on existing development and topography, the offsite flows that reach this site will be routed via earthen swales along the western and northern boundary lines of the project to the basin at the southern portion of the site. This basin will retain the incremental runoff from the site development and will detain a portion of the offsite flow from the northwest. The general direction of storm water flow for this site is from the northwest to the southeast at approximately 2.5%. The site is bounded on all sides by undeveloped land, with an existing power station located in close proximity to the northwest corner of the site. Access to the site is from 16th Avenue.

The site lies in Zone C of the Flood Insurance Rate Map (FIRM) Panel 060245 0900 D, revised November 11, 1996, for Riverside County, prepared by the Federal Emergency Management Agency (FEMA). Zone C represents areas of minimal flooding. See Plate 3 for FIRM map.

Hydrology

The synthetic unit hydrograph for Riverside County was used to calculate peak flows and volumes for the 100 year 3, 6, and 24 hour events. The site will be designed to retain the incremental runoff (difference between historic and developed) from the worst-case 100-year event. Since the site is located in unincorporated areas and has no affect on existing/proposed developments and/or county road rights of ways, site runoff will be allowed to flow overland to the retention basin at the south end of the site.

For the purposes of this report, the site will be separated into a single drainage basin, Basin A. Please note the calculations in the appendix and the summary table on the Drainage Exhibit.

The complete design worksheets have been included for Basin A.

While the site has been designed to provide the incremental retention volumes, the actual design and grading will result in providing storage in excess of the incremental flows for the fully developed site.

Retention Basin Characteristics:

Required Volume-Historic (100-yr/3-hr):	48,602 cf
Required Volume-Developed (100-yr/3-hr):	85,511 cf
Provided Volume:	102,000 cf
Basin Depth:	5-feet

Conclusion

1. The Sentinel Power Station project has been designed to provide storm drainage retention for the incremental runoff, but the retention basin will actually provide retention for the fully-developed site for the "worse case" 100-year event (3-hour);
2. The runoff from onsite access and parking will be collected and discharged (overland) into the retention pond;
3. The offsite flows will be conveyed overland via earthen swales along the project's westerly, easterly, and northerly boundaries to the retention basin at the south end of the site.

Appendix A

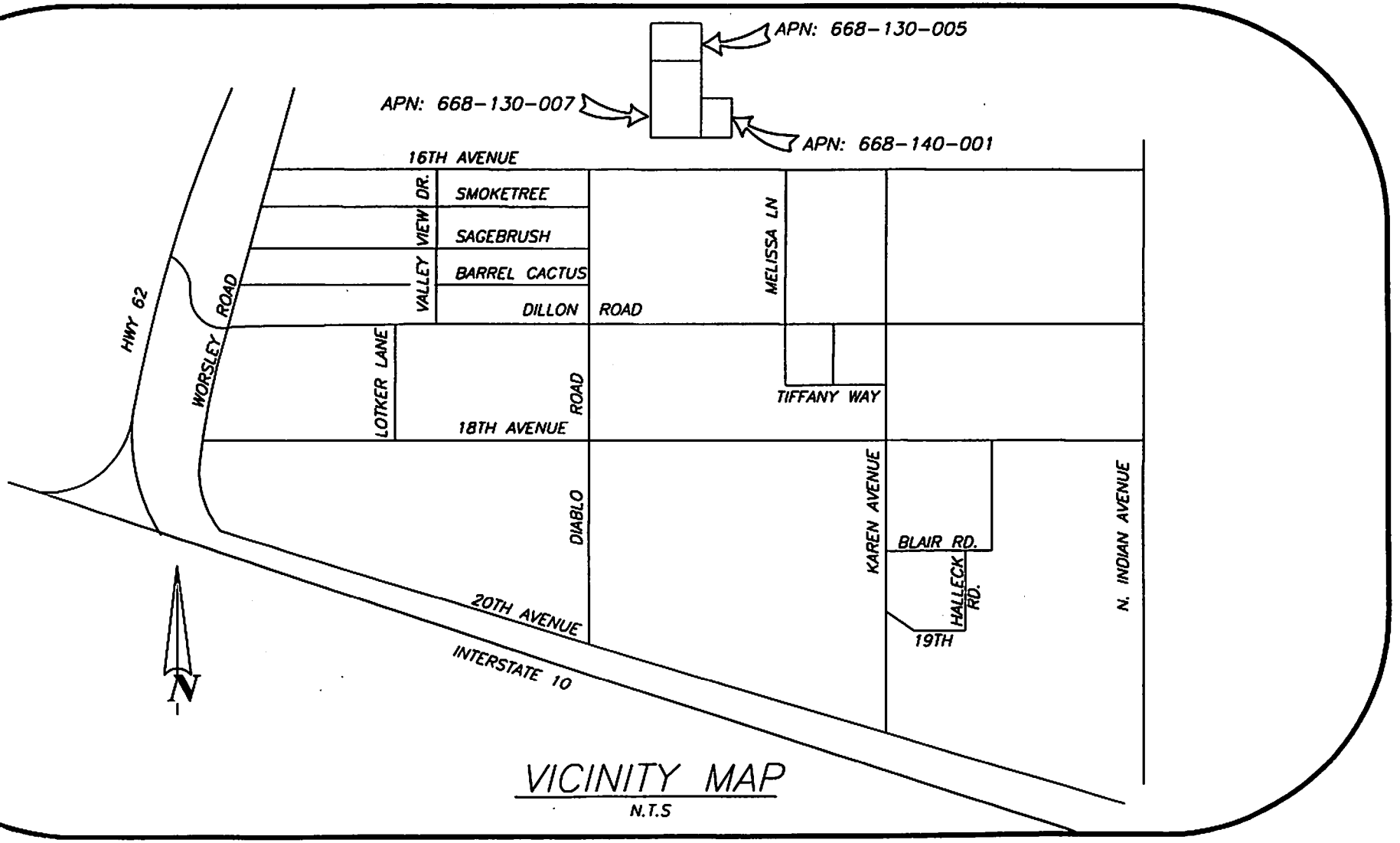
Plate 1 – Vicinity Map

Plate D-4.4 – 100-year, 1-hour Precipitation

Plate E-5.2 – 100-year, 3-hour Precipitation
Plate E-5.4 – 100-year, 6-hour Precipitation
Plate E-5.6 – 100-year, 24-hour Precipitation

Preliminary Drainage Map

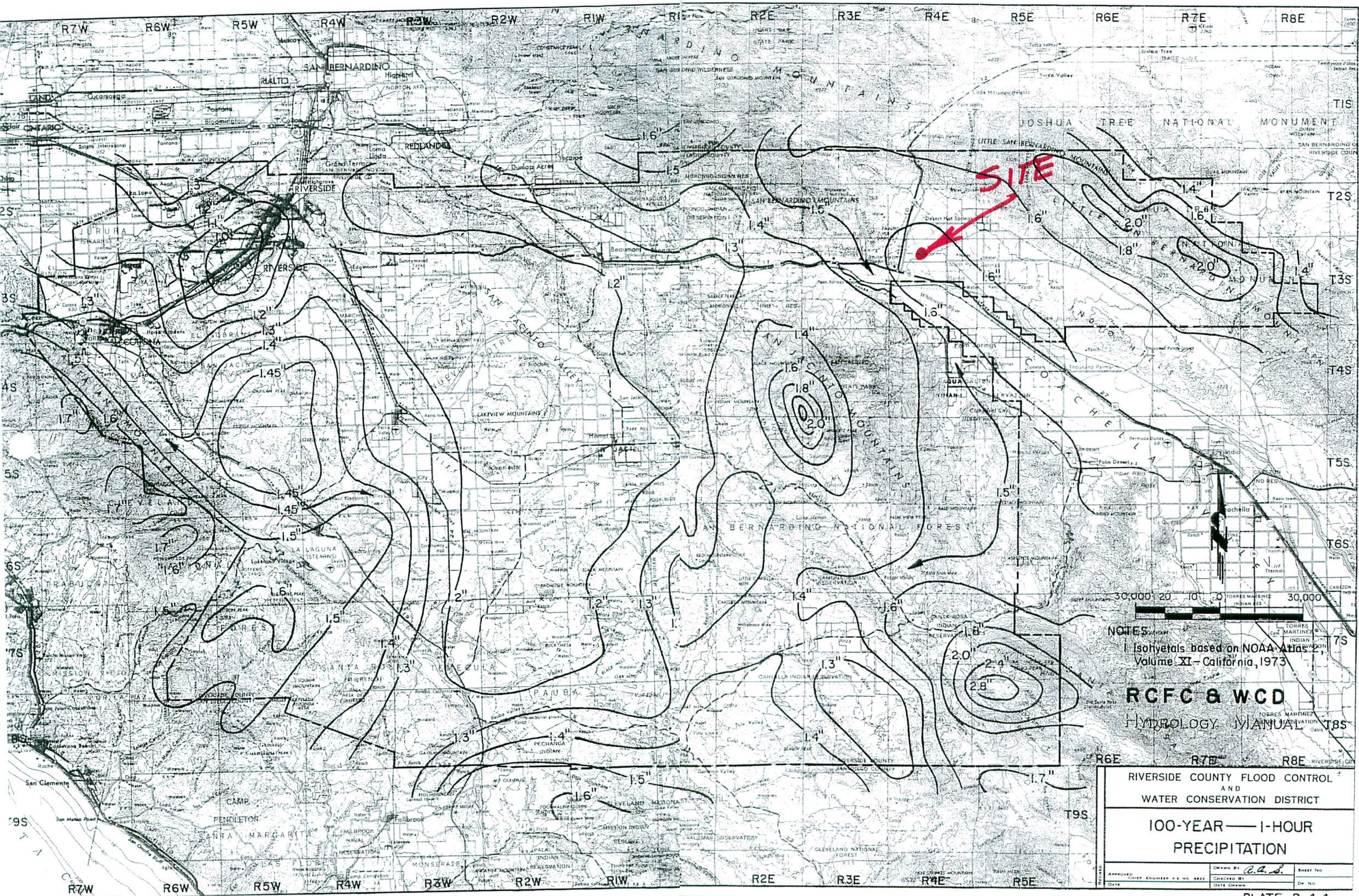
Hydrologic Calculations



VICINITY MAP

N.T.S

O:\201_1053\201_105300\drawings\survey\ALTA Survey\2016105300_ALTAa_SHT1.dwg, 6/5/2007 10:25:36 AM, LaserJet 8150.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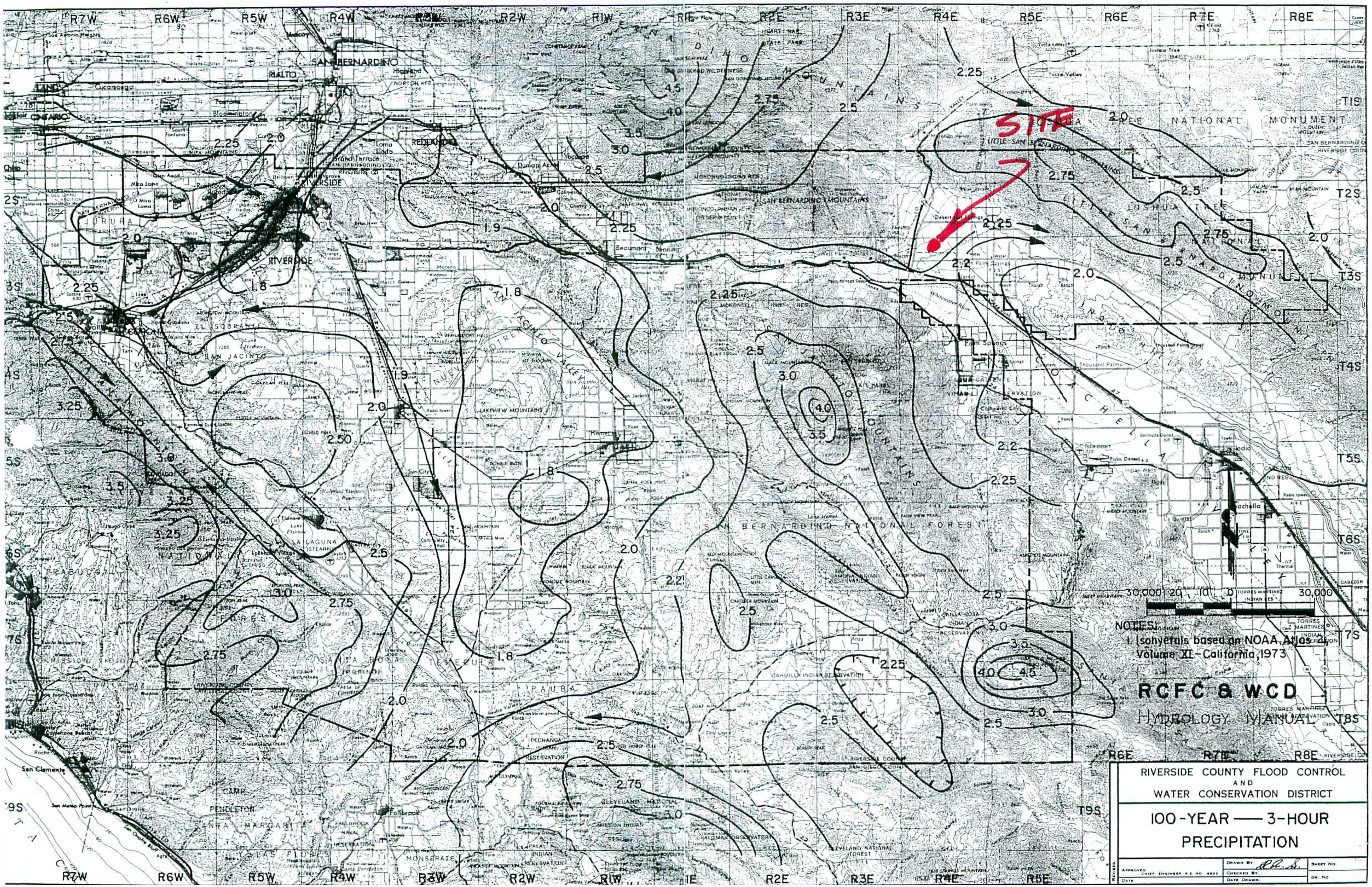
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
DRAWN BY
CHECKED BY
DATE DRAWN
SHEET NO.
DR. NO.
APPROVED
CHIEF ENGINEER R.E. NO. 8822
DATE
REVISED
PLATE D-4.4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NOTES:
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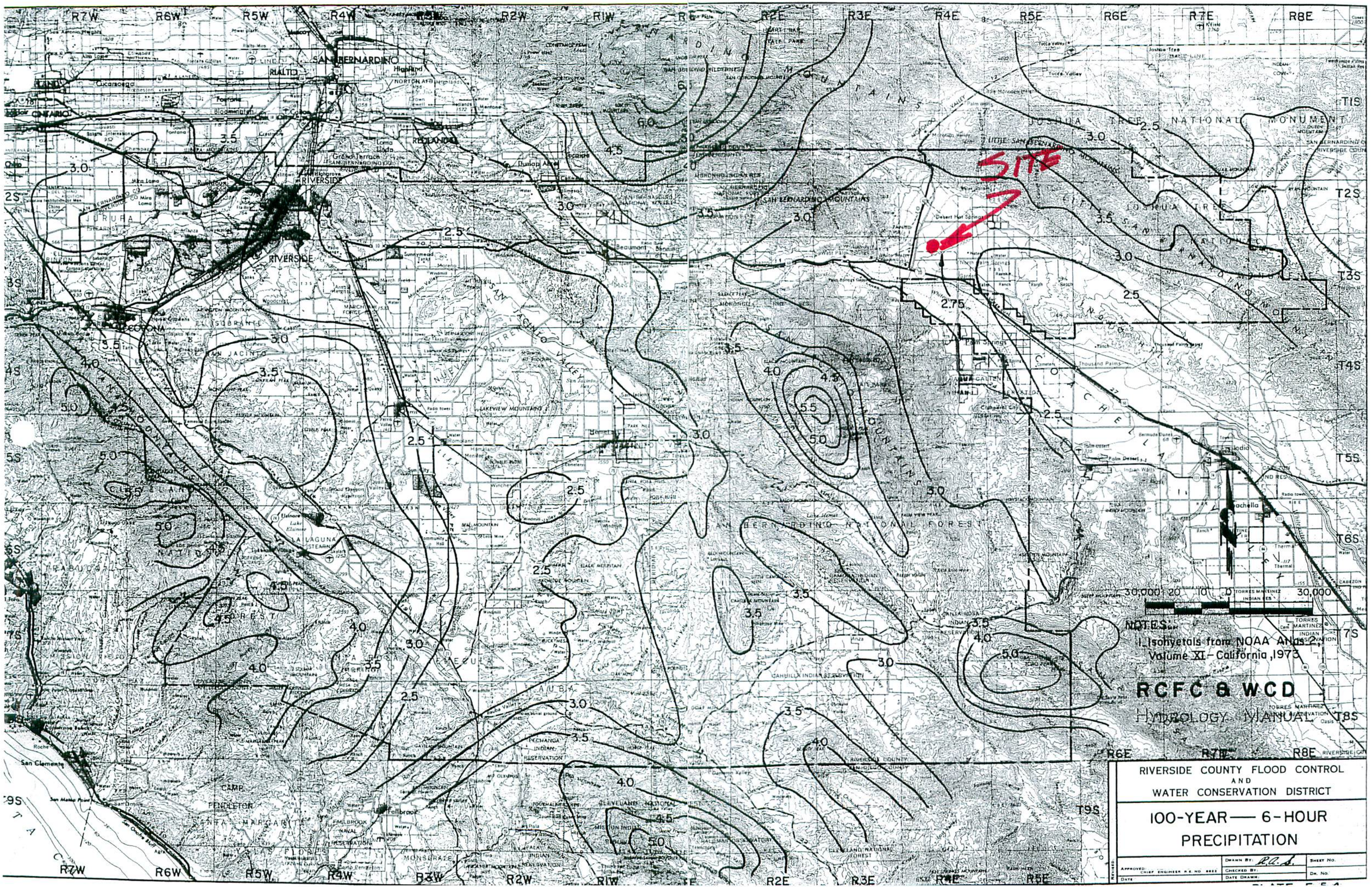
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR —— 3-HOUR PRECIPITATION
SAN BERNARDINO
RIVERSIDE
SAN BERNARDINO NATIONAL FOREST
JOSHUA TREE NATIONAL MONUMENT
San Clemente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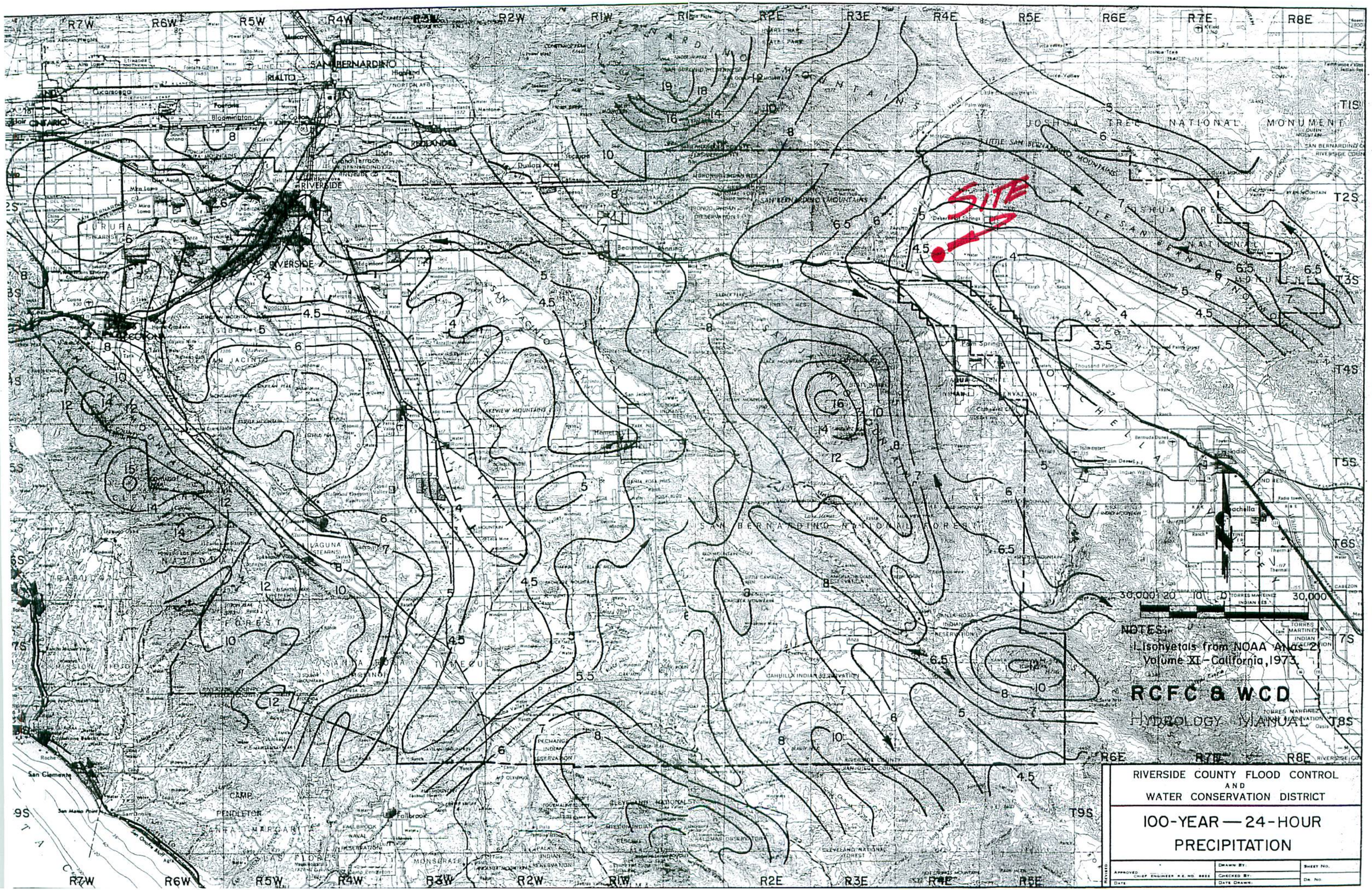
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR
PRECIPITATION
DRAWN BY:
CHECKED BY:
DATE DRAWN:
SHEET NO.
DR. NO.
APPROVED:
CHIEF ENGINEER R.E. NO. 8825
DATE
REVISED
PLATE E-5.4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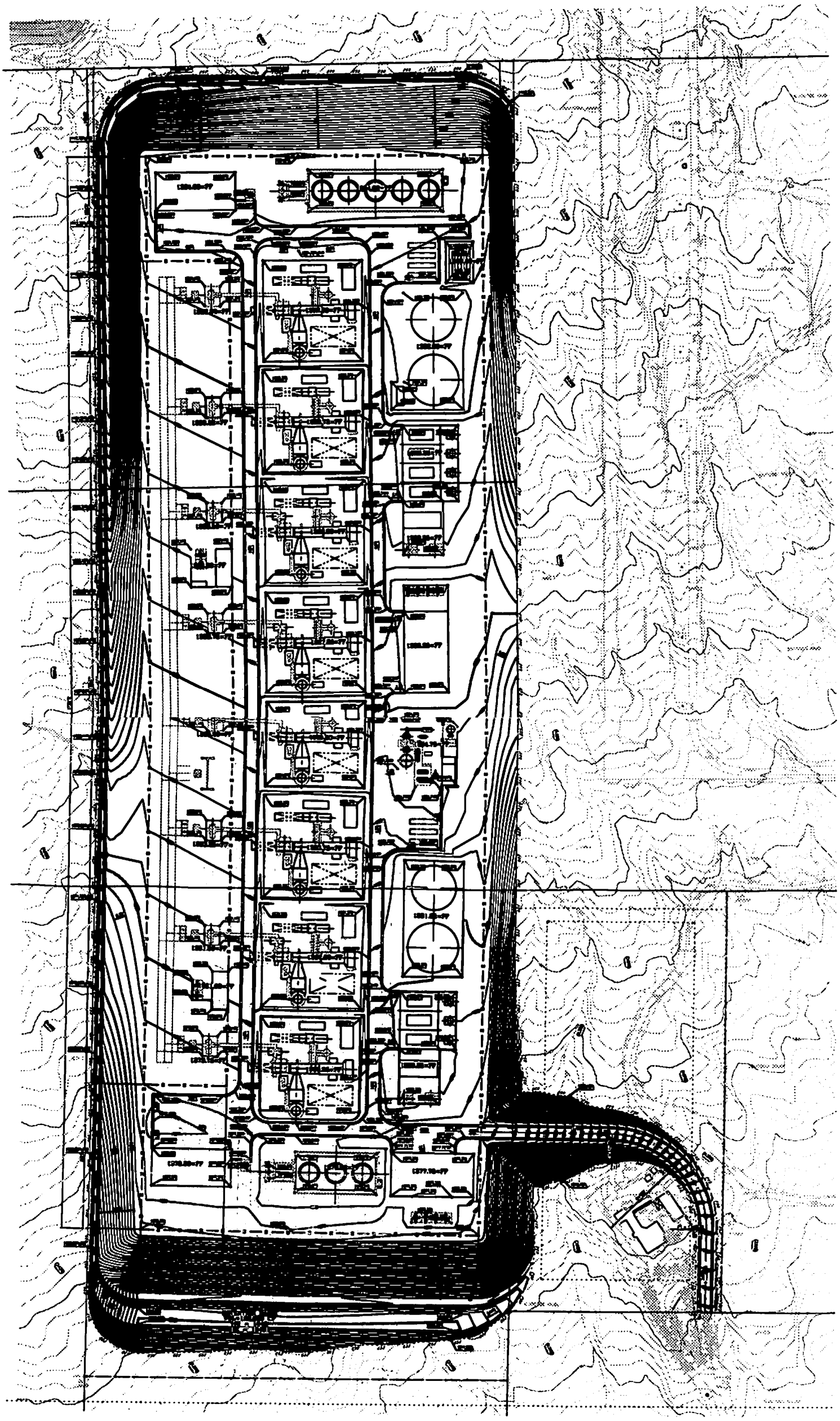
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
DRAWN BY:
CHECKED BY:
DATE DRAWN:
SHEET NO.
DR. NO.
APPROVED
CHIEF ENGINEER R.E. NO. 8888
DATE
REVISED
SAN BERNARDINO
RIVERSIDE
RIALTO
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
Palm Springs
Indio
Coachella
Hemet
Temecula
Fallbrook
San Clemente
CAMP PENDLETON
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E

POWER PLANT
CONCEPTUAL DRAINAGE EXHIBIT



PREPARED: June 08, 2007

STANTEC CONSULTING INC.
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SUITE 100
PALM DESERT, CA 92260
760 346 9844
Stantec

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	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	DCR		
5				
6	PROJECT NAME	SENTINEL POWER STATION		
7	TKC JOB #	2016105300		
8				
9	CONCENTRATION POINT DESIGNATION	Developed Retention		
10	AREA DESIGNATION	Basin A		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE	0		
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE	22.7		
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	2100		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	450		
30				
31	ELEVATION OF HEADWATER	1125		
32	ELEVATION OF CONCENTRATION POINT	1040		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.55		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	2.2		
40	6-HOUR	2.75		
41	24-HOUR	5		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		1039.9	0	
45		1040	5500	
46		1041	14107	
47		1042	19150	
48		1043	23126	
49		1044	27200	
50		1045	32000	
51				
52	PERCOLATION RATE (in/hr)	4		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT: SENTINEL POWER STATION		
BASIC DATA CALCULATION FORM	TKC JOB # 2016105300		
SHORTCUT METHOD	BY DCR	DATE	6/19/2007

PHYSICAL DATA

[1] CONCENTRATION POINT	Developed Retention
[2] AREA DESIGNATION	Basin A
[3] AREA - ACRES	22.700
[4] L-FEET	2100
[5] L-MILES	0.398
[6] La-FEET	450.00
[7] La-MILES	0.085
[8] ELEVATION OF HEADWATER	1125
[9] ELEVATION OF CONCENTRATION POINT	1040
[10] H-FEET	85
[11] S-FEET/MILE	213.7
[12] S^0.5	14.62
[13] L*LCA/S^0.5	0.002
[14] AVERAGE MANNINGS 'N'	0.55
[15] LAG TIME-HOURS	1.32
[16] LAG TIME-MINUTES	79.0
[17] 100% OF LAG-MINUTES	79.0
[18] 200% OF LAG-MINUTES	158.0
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
2.20	22.700	1.00	2.20	2.75	22.700	1.00	2.75	5.00	22.700	1.00	5.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	22.7	SUM [7]	2.20	SUM [9]	22.70	SUM [11]	2.75	SUM [13]	22.70	SUM [15]	5.00
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			2.20				2.75				5.00

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	1.05	0.96	0.99
FLOOD VOLUME	(cu-ft)	86,224	79,092	81,466
	(acre-ft)	1.98	1.82	1.87
REQUIRED STORAGE	(cu-ft)	85,511	78,438	80,793
	(acre-ft)	1.96	1.80	1.85
PEAK FLOW	(cfs)	39.90	32.71	7.48
MAXIMUM WSEL	(ft)	1,044.42	1,044.18	1,044.26

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT SENTINEL POWER STATION
CONCENTRATION POINT: Developed Retention
BY DCR DATE 6/19/2007

AVERAGE ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.00	0.000	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	22.70	1.000	0.4070
A	MF - CONDOMINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.00	0.000	0.0000
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	22.7	SUM	0.4070

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.2035

C= 0.00377

Ft=C(24-(T/60))^1.55 = 0.00377 (24-(T/60))^1.55 + 0.20 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 3 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Developed Retention BY: DCR DATE 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.70		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	78.98		
UNIT TIME-PERCENT OF LAG	6.3		
TOTAL ADJUSTED STORM RAIN-INCHES	2.20		
CONSTANT LOSS RATE-in/hr	0.41		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.343	0.41	0.31	0.03	0.78	233.72
2	10	0.17	1.3	0.343	0.41	0.31	0.03	0.78	233.72
3	15	0.25	1.1	0.290	0.41	0.26	0.03	0.66	197.76
4	20	0.33	1.5	0.396	0.41	0.36	0.04	0.90	269.68
5	25	0.42	1.5	0.396	0.41	0.36	0.04	0.90	269.68
6	30	0.50	1.8	0.475	0.41	0.43	0.07	1.55	464.44
7	35	0.58	1.5	0.396	0.41	0.36	0.04	0.90	269.68
8	40	0.67	1.8	0.475	0.41	0.43	0.07	1.55	464.44
9	45	0.75	1.8	0.475	0.41	0.43	0.07	1.55	464.44
10	50	0.83	1.5	0.396	0.41	0.36	0.04	0.90	269.68
11	55	0.92	1.6	0.422	0.41	0.38	0.02	0.35	104.87
12	60	1.00	1.8	0.475	0.41	0.43	0.07	1.55	464.44
13	65	1.08	2.2	0.581	0.41	0.52	0.17	3.95	1183.58
14	70	1.17	2.2	0.581	0.41	0.52	0.17	3.95	1183.58
15	75	1.25	2.2	0.581	0.41	0.52	0.17	3.95	1183.58
16	80	1.33	2.0	0.528	0.41	0.48	0.12	2.75	824.01
17	85	1.42	2.6	0.686	0.41	0.62	0.28	6.34	1902.71
18	90	1.50	2.7	0.713	0.41	0.64	0.31	6.94	2082.50
19	95	1.58	2.4	0.634	0.41	0.57	0.23	5.14	1543.15
20	100	1.67	2.7	0.713	0.41	0.64	0.31	6.94	2082.50
21	105	1.75	3.3	0.871	0.41	0.78	0.46	10.54	3161.20
22	110	1.83	3.1	0.818	0.41	0.74	0.41	9.34	2801.63
23	115	1.92	2.9	0.766	0.41	0.69	0.36	8.14	2442.07
24	120	2.00	3.0	0.792	0.41	0.71	0.39	8.74	2621.85
25	125	2.08	3.1	0.818	0.41	0.74	0.41	9.34	2801.63
26	130	2.17	4.2	1.109	0.41	1.00	0.70	15.93	4779.26
27	135	2.25	5.0	1.320	0.41	1.19	0.91	20.73	6217.53
28	140	2.33	3.5	0.924	0.41	0.83	0.52	11.74	3520.77
29	145	2.42	6.8	1.795	0.41	1.62	1.39	31.51	9453.64
30	150	2.50	7.3	1.927	0.41	1.73	1.52	34.51	10352.56
31	155	2.58	8.2	2.165	0.41	1.95	1.76	39.90	11970.62
32	160	2.67	5.9	1.558	0.41	1.40	1.15	26.12	7835.59
33	165	2.75	2.0	0.528	0.41	0.48	0.12	2.75	824.01
34	170	2.83	1.8	0.475	0.41	0.43	0.07	1.55	464.44
35	175	2.92	1.8	0.475	0.41	0.43	0.07	1.55	464.44
36	180	3.00	0.6	0.158	0.41	0.14	0.02	0.36	107.87

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.05
FLOOD VOLUME (acft)	1.98
FLOOD VOLUME (cuft)	86224.19
REQUIRED STORAGE (acft)	1.96
REQUIRED STORAGE (cuft)	85511.26
PEAK FLOW RATE (cfs)	39.90

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Developed Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.70		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	78.98		
UNIT TIME-PERCENT OF LAG	6.3		
TOTAL ADJUSTED STORM RAIN-INCHES	2.75		
CONSTANT LOSS RATE-in/hr	0.407		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	0.5	0.165	0.41	0.15	0.02	0.37	112.37
2	10	0.17	0.6	0.198	0.41	0.18	0.02	0.45	134.84
3	15	0.25	0.6	0.198	0.41	0.18	0.02	0.45	134.84
4	20	0.33	0.6	0.198	0.41	0.18	0.02	0.45	134.84
5	25	0.42	0.6	0.198	0.41	0.18	0.02	0.45	134.84
6	30	0.50	0.7	0.231	0.41	0.21	0.02	0.52	157.31
7	35	0.58	0.7	0.231	0.41	0.21	0.02	0.52	157.31
8	40	0.67	0.7	0.231	0.41	0.21	0.02	0.52	157.31
9	45	0.75	0.7	0.231	0.41	0.21	0.02	0.52	157.31
10	50	0.83	0.7	0.231	0.41	0.21	0.02	0.52	157.31
11	55	0.92	0.7	0.231	0.41	0.21	0.02	0.52	157.31
12	60	1.00	0.8	0.264	0.41	0.24	0.03	0.60	179.78
13	65	1.08	0.8	0.264	0.41	0.24	0.03	0.60	179.78
14	70	1.17	0.8	0.264	0.41	0.24	0.03	0.60	179.78
15	75	1.25	0.8	0.264	0.41	0.24	0.03	0.60	179.78
16	80	1.33	0.8	0.264	0.41	0.24	0.03	0.60	179.78
17	85	1.42	0.8	0.264	0.41	0.24	0.03	0.60	179.78
18	90	1.50	0.8	0.264	0.41	0.24	0.03	0.60	179.78
19	95	1.58	0.8	0.264	0.41	0.24	0.03	0.60	179.78
20	100	1.67	0.8	0.264	0.41	0.24	0.03	0.60	179.78
21	105	1.75	0.8	0.264	0.41	0.24	0.03	0.60	179.78
22	110	1.83	0.8	0.264	0.41	0.24	0.03	0.60	179.78
23	115	1.92	0.8	0.264	0.41	0.24	0.03	0.60	179.78
24	120	2.00	0.9	0.297	0.41	0.27	0.03	0.67	202.26
25	125	2.08	0.8	0.264	0.41	0.24	0.03	0.60	179.78
26	130	2.17	0.9	0.297	0.41	0.27	0.03	0.67	202.26
27	135	2.25	0.9	0.297	0.41	0.27	0.03	0.67	202.26
28	140	2.33	0.9	0.297	0.41	0.27	0.03	0.67	202.26
29	145	2.42	0.9	0.297	0.41	0.27	0.03	0.67	202.26
30	150	2.50	0.9	0.297	0.41	0.27	0.03	0.67	202.26
31	155	2.58	0.9	0.297	0.41	0.27	0.03	0.67	202.26
32	160	2.67	0.9	0.297	0.41	0.27	0.03	0.67	202.26
33	165	2.75	1.0	0.330	0.41	0.30	0.03	0.75	224.73
34	170	2.83	1.0	0.330	0.41	0.30	0.03	0.75	224.73
35	175	2.92	1.0	0.330	0.41	0.30	0.03	0.75	224.73
36	180	3.00	1.0	0.330	0.41	0.30	0.03	0.75	224.73
37	185	3.08	1.0	0.330	0.41	0.30	0.03	0.75	224.73
38	190	3.17	1.1	0.363	0.41	0.33	0.04	0.82	247.20
39	195	3.25	1.1	0.363	0.41	0.33	0.04	0.82	247.20
40	200	3.33	1.1	0.363	0.41	0.33	0.04	0.82	247.20
41	205	3.42	1.2	0.396	0.41	0.36	0.04	0.90	269.68
42	210	3.50	1.3	0.429	0.41	0.39	0.02	0.50	149.82
43	215	3.58	1.4	0.462	0.41	0.42	0.05	1.25	374.55
44	220	3.67	1.4	0.462	0.41	0.42	0.05	1.25	374.55
45	225	3.75	1.5	0.495	0.41	0.45	0.09	2.00	599.28
46	230	3.83	1.5	0.495	0.41	0.45	0.09	2.00	599.28
47	235	3.92	1.6	0.528	0.41	0.48	0.12	2.75	824.01
48	240	4.00	1.6	0.528	0.41	0.48	0.12	2.75	824.01
49	245	4.08	1.7	0.561	0.41	0.50	0.15	3.50	1048.74
50	250	4.17	1.8	0.594	0.41	0.53	0.19	4.24	1273.47
51	255	4.25	1.9	0.627	0.41	0.56	0.22	4.99	1498.20
52	260	4.33	2.0	0.660	0.41	0.59	0.25	5.74	1722.93
53	265	4.42	2.1	0.693	0.41	0.62	0.29	6.49	1947.66
54	270	4.50	2.1	0.693	0.41	0.62	0.29	6.49	1947.66
55	275	4.58	2.2	0.726	0.41	0.65	0.32	7.24	2172.39
56	280	4.67	2.3	0.759	0.41	0.68	0.35	7.99	2397.12

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Developed Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.70		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	78.98		
UNIT TIME-PERCENT OF LAG	6.3		
TOTAL ADJUSTED STORM RAIN-INCHES	2.75		
CONSTANT LOSS RATE-in/hr	0.407		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
57	285	4.75	2.4	0.792	0.41	0.71	0.39	8.74	2621.85
58	290	4.83	2.4	0.792	0.41	0.71	0.39	8.74	2621.85
59	295	4.92	2.5	0.825	0.41	0.74	0.42	9.49	2846.58
60	300	5.00	2.6	0.858	0.41	0.77	0.45	10.24	3071.31
61	305	5.08	3.1	1.023	0.41	0.92	0.62	13.98	4194.96
62	310	5.17	3.6	1.188	0.41	1.07	0.78	17.73	5318.61
63	315	5.25	3.9	1.287	0.41	1.16	0.88	19.98	5992.80
64	320	5.33	4.2	1.386	0.41	1.25	0.98	22.22	6666.99
65	325	5.42	4.7	1.551	0.41	1.40	1.14	25.97	7790.64
66	330	5.50	5.6	1.848	0.41	1.66	1.44	32.71	9813.21
67	335	5.58	1.9	0.627	0.41	0.58	0.22	4.99	1498.20
68	340	5.67	0.9	0.297	0.41	0.27	0.03	0.67	202.26
69	345	5.75	0.6	0.198	0.41	0.18	0.02	0.45	134.84
70	350	5.83	0.5	0.165	0.41	0.15	0.02	0.37	112.37
71	355	5.92	0.3	0.099	0.41	0.09	0.01	0.22	67.42
72	360	6.00	0.2	0.066	0.41	0.06	0.01	0.15	44.95

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.96
FLOOD VOLUME (acft)	1.82
FLOOD VOLUME (cuft)	79092.22
REQUIRED STORAGE (acft)	1.80
REQUIRED STORAGE (cuft)	78438.26
PEAK FLOW RATE (cfs)	32.71

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Developed Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.700	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.4070
LAG TIME - MINUTES	78.98	MINIMUM LOSS RATE (for var. loss) - in/hr	0.204
UNIT TIME-PERCENT OF LAG	19.0	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	5.00	C	0.00377
		PERCOLATION RATE (cfs)	0.00

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	15	0.25	0.2	0.040	0.719	0.036	0.004	0.09	81.72
2	30	0.50	0.3	0.060	0.710	0.054	0.006	0.14	122.58
3	45	0.75	0.3	0.060	0.702	0.054	0.006	0.14	122.58
4	60	1.00	0.4	0.080	0.694	0.072	0.008	0.18	163.44
5	75	1.25	0.3	0.060	0.686	0.054	0.006	0.14	122.58
6	90	1.50	0.3	0.060	0.678	0.054	0.006	0.14	122.58
7	105	1.75	0.3	0.060	0.669	0.054	0.006	0.14	122.58
8	120	2.00	0.4	0.080	0.661	0.072	0.008	0.18	163.44
9	135	2.25	0.4	0.080	0.653	0.072	0.008	0.18	163.44
10	150	2.50	0.4	0.080	0.645	0.072	0.008	0.18	163.44
11	165	2.75	0.5	0.100	0.638	0.090	0.010	0.23	204.30
12	180	3.00	0.5	0.100	0.630	0.090	0.010	0.23	204.30
13	195	3.25	0.5	0.100	0.622	0.090	0.010	0.23	204.30
14	210	3.50	0.5	0.100	0.614	0.090	0.010	0.23	204.30
15	225	3.75	0.5	0.100	0.606	0.090	0.010	0.23	204.30
16	240	4.00	0.6	0.120	0.599	0.108	0.012	0.27	245.16
17	255	4.25	0.6	0.120	0.591	0.108	0.012	0.27	245.16
18	270	4.50	0.7	0.140	0.584	0.126	0.014	0.32	286.02
19	285	4.75	0.7	0.140	0.576	0.126	0.014	0.32	286.02
20	300	5.00	0.8	0.160	0.569	0.144	0.016	0.36	326.88
21	315	5.25	0.6	0.120	0.561	0.108	0.012	0.27	245.16
22	330	5.50	0.7	0.140	0.554	0.126	0.014	0.32	286.02
23	345	5.75	0.8	0.160	0.547	0.144	0.016	0.36	326.88
24	360	6.00	0.8	0.160	0.540	0.144	0.016	0.36	326.88
25	375	6.25	0.9	0.180	0.532	0.162	0.018	0.41	367.74
26	390	6.50	0.9	0.180	0.525	0.162	0.018	0.41	367.74
27	405	6.75	1.0	0.200	0.518	0.180	0.020	0.45	408.60
28	420	7.00	1.0	0.200	0.511	0.180	0.020	0.45	408.60
29	435	7.25	1.0	0.200	0.504	0.180	0.020	0.45	408.60
30	450	7.50	1.1	0.220	0.498	0.198	0.022	0.50	449.46
31	465	7.75	1.2	0.240	0.491	0.216	0.024	0.54	490.32
32	480	8.00	1.3	0.260	0.484	0.234	0.026	0.59	531.18
33	495	8.25	1.5	0.300	0.477	0.270	0.030	0.68	612.90
34	510	8.50	1.5	0.300	0.471	0.270	0.030	0.68	612.90
35	525	8.75	1.6	0.320	0.464	0.288	0.032	0.73	653.76
36	540	9.00	1.7	0.340	0.457	0.306	0.034	0.77	694.62
37	555	9.25	1.9	0.380	0.451	0.342	0.038	0.86	776.34
38	570	9.50	2.0	0.400	0.445	0.360	0.040	0.91	817.20
39	585	9.75	2.1	0.420	0.438	0.378	0.042	0.95	858.06
40	600	10.00	2.2	0.440	0.432	0.396	0.008	0.18	165.95
41	615	10.25	1.5	0.300	0.426	0.270	0.030	0.68	612.90
42	630	10.50	1.5	0.300	0.419	0.270	0.030	0.68	612.90
43	645	10.75	2.0	0.400	0.413	0.360	0.040	0.91	817.20
44	660	11.00	2.0	0.400	0.407	0.360	0.040	0.91	817.20
45	675	11.25	1.9	0.380	0.401	0.342	0.038	0.86	776.34
46	690	11.50	1.9	0.380	0.395	0.342	0.038	0.86	776.34
47	705	11.75	1.7	0.340	0.390	0.306	0.034	0.77	694.62
48	720	12.00	1.8	0.360	0.384	0.324	0.036	0.82	735.48
49	735	12.25	2.5	0.500	0.378	0.450	0.122	2.77	2491.99
50	750	12.50	2.6	0.520	0.372	0.468	0.148	3.35	3016.26
51	765	12.75	2.8	0.560	0.367	0.504	0.193	4.39	3947.77
52	780	13.00	2.9	0.580	0.361	0.522	0.219	4.97	4469.31
53	795	13.25	3.4	0.680	0.356	0.612	0.324	7.36	6623.86
54	810	13.50	3.4	0.680	0.350	0.612	0.330	7.48	6734.01
55	825	13.75	2.3	0.460	0.345	0.414	0.115	2.61	2348.15
56	840	14.00	2.3	0.460	0.340	0.414	0.120	2.73	2455.45
57	855	14.25	2.7	0.540	0.335	0.486	0.205	4.66	4195.70
58	870	14.50	2.6	0.520	0.330	0.468	0.190	4.32	3891.49
59	885	14.75	2.6	0.520	0.324	0.468	0.196	4.44	3994.40
60	900	15.00	2.5	0.500	0.320	0.450	0.180	4.10	3687.21

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Developed Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.700	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.4070
LAG TIME - MINUTES	78.98	MINIMUM LOSS RATE (for var. loss) - in/hr	0.204
UNIT TIME-PERCENT OF LAG	19.0	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	5.00	C	0.00377
		PERCOLATION RATE (cfs)	0.00

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
61	915	15.25	2.4	0.480	0.315	0.432	0.165	3.75	3378.51
62	930	15.50	2.3	0.460	0.310	0.414	0.150	3.41	3068.27
63	945	15.75	1.9	0.380	0.305	0.342	0.075	1.70	1530.67
64	960	16.00	1.9	0.380	0.300	0.342	0.080	1.81	1625.89
65	975	16.25	0.4	0.080	0.296	0.072	0.008	0.18	163.44
66	990	16.50	0.4	0.080	0.291	0.072	0.008	0.18	163.44
67	1005	16.75	0.3	0.060	0.287	0.054	0.006	0.14	122.58
68	1020	17.00	0.3	0.060	0.283	0.054	0.006	0.14	122.58
69	1035	17.25	0.5	0.100	0.278	0.090	0.010	0.23	204.30
70	1050	17.50	0.5	0.100	0.274	0.090	0.010	0.23	204.30
71	1065	17.75	0.5	0.100	0.270	0.090	0.010	0.23	204.30
72	1080	18.00	0.4	0.080	0.266	0.072	0.008	0.18	163.44
73	1095	18.25	0.4	0.080	0.262	0.072	0.008	0.18	163.44
74	1110	18.50	0.4	0.080	0.258	0.072	0.008	0.18	163.44
75	1125	18.75	0.3	0.060	0.255	0.054	0.006	0.14	122.58
76	1140	19.00	0.2	0.040	0.251	0.036	0.004	0.09	81.72
77	1155	19.25	0.3	0.060	0.247	0.054	0.006	0.14	122.58
78	1170	19.50	0.4	0.080	0.244	0.072	0.008	0.18	163.44
79	1185	19.75	0.3	0.060	0.241	0.054	0.006	0.14	122.58
80	1200	20.00	0.2	0.040	0.237	0.036	0.004	0.09	81.72
81	1215	20.25	0.3	0.060	0.234	0.054	0.006	0.14	122.58
82	1230	20.50	0.3	0.060	0.231	0.054	0.006	0.14	122.58
83	1245	20.75	0.3	0.060	0.228	0.054	0.006	0.14	122.58
84	1260	21.00	0.2	0.040	0.226	0.036	0.004	0.09	81.72
85	1275	21.25	0.3	0.060	0.223	0.054	0.006	0.14	122.58
86	1290	21.50	0.2	0.040	0.220	0.036	0.004	0.09	81.72
87	1305	21.75	0.3	0.060	0.218	0.054	0.006	0.14	122.58
88	1320	22.00	0.2	0.040	0.216	0.036	0.004	0.09	81.72
89	1335	22.25	0.3	0.060	0.213	0.054	0.006	0.14	122.58
90	1350	22.50	0.2	0.040	0.211	0.036	0.004	0.09	81.72
91	1365	22.75	0.2	0.040	0.210	0.036	0.004	0.09	81.72
92	1380	23.00	0.2	0.040	0.208	0.036	0.004	0.09	81.72
93	1395	23.25	0.2	0.040	0.207	0.036	0.004	0.09	81.72
94	1410	23.50	0.2	0.040	0.205	0.036	0.004	0.09	81.72
95	1425	23.75	0.2	0.040	0.204	0.036	0.004	0.09	81.72
96	1440	24.00	0.2	0.040	0.204	0.036	0.004	0.09	81.72

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.99
FLOOD VOLUME (acft)	1.87
FLOOD VOLUME (cuft)	81466.11
REQUIRED STORAGE (acft)	1.85
REQUIRED STORAGE (cuft)	80792.52
PEAK FLOW (cfs)	7.48

PROJECT: SENTINEL POWER STATION
TKC JOB # 2016105300
Developed Retention

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
1039.9	0	0		0	0	0	0.00
1040	0.1	0.1	5500	5500	275	275	0.01
1041	1	1.1	8607	14107	9804	10078	0.23
1042	1	2.1	5043	19150	16629	26707	0.61
1043	1	3.1	3976	23126	21138	47845	1.10
1044	1	4.1	4074	27200	25163	73008	1.68
1045	1	5.1	4800	32000	29600	102608	2.36

PERCOLATION CALCULATIONS

PERCOLATION RATE	4 in/hr	0.00 cfs
MAXWELL IV DRYWELLS		
NUMBER USED	0	
RATE/DRYWELL	0 cfs	
TOTAL DISSIPATED		0 cfs
TOTAL PERCOLATION RATE		0.00 cfs

Developed Retention
TKC JOB # 2016105300
100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.78	234	234	0	234	1,039.98	234	0.01
2	10	0.78	234	467	0	467	1,040.02	467	0.01
3	15	0.66	198	665	0	665	1,040.04	665	0.02
4	20	0.90	270	935	0	935	1,040.07	935	0.02
5	25	0.90	270	1,205	0	1,205	1,040.09	1,205	0.03
6	30	1.55	464	1,669	0	1,669	1,040.14	1,669	0.04
7	35	0.90	270	1,939	0	1,939	1,040.17	1,939	0.04
8	40	1.55	464	2,403	0	2,403	1,040.22	2,403	0.06
9	45	1.55	464	2,868	0	2,868	1,040.26	2,868	0.07
10	50	0.90	270	3,137	0	3,137	1,040.29	3,137	0.07
11	55	0.35	105	3,242	0	3,242	1,040.30	3,242	0.07
12	60	1.55	464	3,707	0	3,707	1,040.35	3,707	0.09
13	65	3.95	1,184	4,890	0	4,890	1,040.47	4,890	0.11
14	70	3.95	1,184	6,074	0	6,074	1,040.59	6,074	0.14
15	75	3.95	1,184	7,257	0	7,257	1,040.71	7,257	0.17
16	80	2.75	824	8,081	0	8,081	1,040.80	8,081	0.19
17	85	6.34	1,903	9,984	0	9,984	1,040.99	9,984	0.23
18	90	6.94	2,082	12,067	0	12,067	1,041.12	12,067	0.28
19	95	5.14	1,543	13,610	0	13,610	1,041.21	13,610	0.31
20	100	6.94	2,082	15,692	0	15,692	1,041.34	15,692	0.36
21	105	10.54	3,161	18,853	0	18,853	1,041.53	18,853	0.43
22	110	9.34	2,802	21,655	0	21,655	1,041.70	21,655	0.50
23	115	8.14	2,442	24,097	0	24,097	1,041.84	24,097	0.55
24	120	8.74	2,622	26,719	0	26,719	1,042.00	26,719	0.61
25	125	9.34	2,802	29,521	0	29,521	1,042.13	29,521	0.68
26	130	15.93	4,779	34,300	0	34,300	1,042.36	34,300	0.79
27	135	20.73	6,218	40,517	0	40,517	1,042.65	40,517	0.93
28	140	11.74	3,521	44,038	0	44,038	1,042.82	44,038	1.01
29	145	31.51	9,454	53,492	0	53,492	1,043.22	53,492	1.23
30	150	34.51	10,353	63,844	0	63,844	1,043.64	63,844	1.47
31	155	39.90	11,971	75,815	0	75,815	1,044.09	75,815	1.74
32	160	26.12	7,836	83,650	0	83,650	1,044.36	83,650	1.92
33	165	2.75	824	84,475	0	84,475	1,044.39	84,475	1.94
34	170	1.55	464	84,939	0	84,939	1,044.40	84,939	1.95
35	175	1.55	464	85,403	0	85,403	1,044.42	85,403	1.96
36	180	0.36	108	85,511	0	85,511	1,044.42	85,511	1.96

Developed Retention
TKC JOB # 2016105300
100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	TIME (min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	BALANCE IN BASIN (acre-ft)
1	5	0.37	112	112	0	112	1,039.94	112	0.00
2	10	0.45	135	247	0	247	1,039.99	247	0.01
3	15	0.45	135	382	0	382	1,040.01	382	0.01
4	20	0.45	135	517	0	517	1,040.02	517	0.01
5	25	0.45	135	652	0	652	1,040.04	652	0.01
6	30	0.52	157	809	0	809	1,040.05	809	0.02
7	35	0.52	157	966	0	966	1,040.07	966	0.02
8	40	0.52	157	1,124	0	1,124	1,040.09	1,124	0.03
9	45	0.52	157	1,281	0	1,281	1,040.10	1,281	0.03
10	50	0.52	157	1,438	0	1,438	1,040.12	1,438	0.03
11	55	0.52	157	1,596	0	1,596	1,040.13	1,596	0.04
12	60	0.60	180	1,775	0	1,775	1,040.15	1,775	0.04
13	65	0.60	180	1,955	0	1,955	1,040.17	1,955	0.04
14	70	0.60	180	2,135	0	2,135	1,040.19	2,135	0.05
15	75	0.60	180	2,315	0	2,315	1,040.21	2,315	0.05
16	80	0.60	180	2,495	0	2,495	1,040.23	2,495	0.06
17	85	0.60	180	2,674	0	2,674	1,040.24	2,674	0.06
18	90	0.60	180	2,854	0	2,854	1,040.26	2,854	0.07
19	95	0.60	180	3,034	0	3,034	1,040.28	3,034	0.07
20	100	0.60	180	3,214	0	3,214	1,040.30	3,214	0.07
21	105	0.60	180	3,393	0	3,393	1,040.32	3,393	0.08
22	110	0.60	180	3,573	0	3,573	1,040.34	3,573	0.08
23	115	0.60	180	3,753	0	3,753	1,040.35	3,753	0.09
24	120	0.67	202	3,955	0	3,955	1,040.38	3,955	0.09
25	125	0.60	180	4,135	0	4,135	1,040.39	4,135	0.09
26	130	0.67	202	4,337	0	4,337	1,040.41	4,337	0.10
27	135	0.67	202	4,540	0	4,540	1,040.44	4,540	0.10
28	140	0.67	202	4,742	0	4,742	1,040.46	4,742	0.11
29	145	0.67	202	4,944	0	4,944	1,040.48	4,944	0.11
30	150	0.67	202	5,146	0	5,146	1,040.50	5,146	0.12
31	155	0.67	202	5,349	0	5,349	1,040.52	5,349	0.12
32	160	0.67	202	5,551	0	5,551	1,040.54	5,551	0.13
33	165	0.75	225	5,776	0	5,776	1,040.56	5,776	0.13
34	170	0.75	225	6,000	0	6,000	1,040.58	6,000	0.14
35	175	0.75	225	6,225	0	6,225	1,040.61	6,225	0.14
36	180	0.75	225	6,450	0	6,450	1,040.63	6,450	0.15
37	185	0.75	225	6,674	0	6,674	1,040.65	6,674	0.15
38	190	0.82	247	6,922	0	6,922	1,040.68	6,922	0.16
39	195	0.82	247	7,169	0	7,169	1,040.70	7,169	0.16
40	200	0.82	247	7,416	0	7,416	1,040.73	7,416	0.17
41	205	0.90	270	7,686	0	7,686	1,040.76	7,686	0.18
42	210	0.50	150	7,836	0	7,836	1,040.77	7,836	0.18
43	215	1.25	375	8,210	0	8,210	1,040.81	8,210	0.19
44	220	1.25	375	8,585	0	8,585	1,040.85	8,585	0.20
45	225	2.00	599	9,184	0	9,184	1,040.91	9,184	0.21
46	230	2.00	599	9,783	0	9,783	1,040.97	9,783	0.22
47	235	2.75	824	10,607	0	10,607	1,041.03	10,607	0.24
48	240	2.75	824	11,431	0	11,431	1,041.08	11,431	0.26
49	245	3.50	1,049	12,480	0	12,480	1,041.14	12,480	0.29
50	250	4.24	1,273	13,753	0	13,753	1,041.22	13,753	0.32
51	255	4.99	1,498	15,252	0	15,252	1,041.31	15,252	0.35
52	260	5.74	1,723	16,975	0	16,975	1,041.41	16,975	0.39
53	265	6.49	1,948	18,922	0	18,922	1,041.53	18,922	0.43
54	270	6.49	1,948	20,870	0	20,870	1,041.65	20,870	0.48
55	275	7.24	2,172	23,042	0	23,042	1,041.78	23,042	0.53

Developed Retention
TKC JOB # 2016105300
100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	7.99	2,397	25,439	0	25,439	1,041.92	25,439	0.58
57	285	8.74	2,622	28,061	0	28,061	1,042.06	28,061	0.64
58	290	8.74	2,622	30,683	0	30,683	1,042.19	30,683	0.70
59	295	9.49	2,847	33,530	0	33,530	1,042.32	33,530	0.77
60	300	10.24	3,071	36,601	0	36,601	1,042.47	36,601	0.84
61	305	13.98	4,195	40,796	0	40,796	1,042.67	40,796	0.94
62	310	17.73	5,319	46,115	0	46,115	1,042.92	46,115	1.06
63	315	19.98	5,993	52,107	0	52,107	1,043.17	52,107	1.20
64	320	22.22	6,667	58,774	0	58,774	1,043.43	58,774	1.35
65	325	25.97	7,791	66,565	0	66,565	1,043.74	66,565	1.53
66	330	32.71	9,813	76,378	0	76,378	1,044.11	76,378	1.75
67	335	4.99	1,498	77,876	0	77,876	1,044.16	77,876	1.79
68	340	0.67	202	78,079	0	78,079	1,044.17	78,079	1.79
69	345	0.45	135	78,214	0	78,214	1,044.18	78,214	1.80
70	350	0.37	112	78,326	0	78,326	1,044.18	78,326	1.80
71	355	0.22	67	78,393	0	78,393	1,044.18	78,393	1.80
72	360	0.15	45	78,438	0	78,438	1,044.18	78,438	1.80

Developed Retention
TKC JOB # 2.016E+09
100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	TIME (min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	BALANCE IN BASIN (acre-ft)
1	15	0.09	82	82	0	82	1,039.93	82	0.00
2	30	0.14	123	204	0	204	1,039.97	204	0.00
3	45	0.14	123	327	0	327	1,040.01	327	0.01
4	60	0.18	163	490	0	490	1,040.02	490	0.01
5	75	0.14	123	613	0	613	1,040.03	613	0.01
6	90	0.14	123	735	0	735	1,040.05	735	0.02
7	105	0.14	123	858	0	858	1,040.06	858	0.02
8	120	0.18	163	1,022	0	1,022	1,040.08	1,022	0.02
9	135	0.18	163	1,185	0	1,185	1,040.09	1,185	0.03
10	150	0.18	163	1,348	0	1,348	1,040.11	1,348	0.03
11	165	0.23	204	1,553	0	1,553	1,040.13	1,553	0.04
12	180	0.23	204	1,757	0	1,757	1,040.15	1,757	0.04
13	195	0.23	204	1,961	0	1,961	1,040.17	1,961	0.05
14	210	0.23	204	2,166	0	2,166	1,040.19	2,166	0.05
15	225	0.23	204	2,370	0	2,370	1,040.21	2,370	0.05
16	240	0.27	245	2,615	0	2,615	1,040.24	2,615	0.06
17	255	0.27	245	2,860	0	2,860	1,040.26	2,860	0.07
18	270	0.32	286	3,146	0	3,146	1,040.29	3,146	0.07
19	285	0.32	286	3,432	0	3,432	1,040.32	3,432	0.08
20	300	0.36	327	3,759	0	3,759	1,040.36	3,759	0.09
21	315	0.27	245	4,004	0	4,004	1,040.38	4,004	0.09
22	330	0.32	286	4,290	0	4,290	1,040.41	4,290	0.10
23	345	0.36	327	4,617	0	4,617	1,040.44	4,617	0.11
24	360	0.36	327	4,944	0	4,944	1,040.48	4,944	0.11
25	375	0.41	368	5,312	0	5,312	1,040.51	5,312	0.12
26	390	0.41	368	5,680	0	5,680	1,040.55	5,680	0.13
27	405	0.45	409	6,088	0	6,088	1,040.59	6,088	0.14
28	420	0.45	409	6,497	0	6,497	1,040.63	6,497	0.15
29	435	0.45	409	6,905	0	6,905	1,040.68	6,905	0.16
30	450	0.50	449	7,355	0	7,355	1,040.72	7,355	0.17
31	465	0.54	490	7,845	0	7,845	1,040.77	7,845	0.18
32	480	0.59	531	8,376	0	8,376	1,040.83	8,376	0.19
33	495	0.68	613	8,989	0	8,989	1,040.89	8,989	0.21
34	510	0.68	613	9,602	0	9,602	1,040.95	9,602	0.22
35	525	0.73	654	10,256	0	10,256	1,041.01	10,256	0.24
36	540	0.77	695	10,950	0	10,950	1,041.05	10,950	0.25
37	555	0.86	776	11,727	0	11,727	1,041.10	11,727	0.27
38	570	0.91	817	12,544	0	12,544	1,041.15	12,544	0.29
39	585	0.95	858	13,402	0	13,402	1,041.20	13,402	0.31
40	600	0.18	166	13,568	0	13,568	1,041.21	13,568	0.31
41	615	0.68	613	14,181	0	14,181	1,041.25	14,181	0.33
42	630	0.68	613	14,794	0	14,794	1,041.28	14,794	0.34
43	645	0.91	817	15,611	0	15,611	1,041.33	15,611	0.36
44	660	0.91	817	16,428	0	16,428	1,041.38	16,428	0.38
45	675	0.86	776	17,205	0	17,205	1,041.43	17,205	0.39
46	690	0.86	776	17,981	0	17,981	1,041.48	17,981	0.41
47	705	0.77	695	18,676	0	18,676	1,041.52	18,676	0.43
48	720	0.82	735	19,411	0	19,411	1,041.56	19,411	0.45
49	735	2.77	2,492	21,903	0	21,903	1,041.71	21,903	0.50
50	750	3.35	3,016	24,919	0	24,919	1,041.89	24,919	0.57
51	765	4.39	3,948	28,867	0	28,867	1,042.10	28,867	0.66
52	780	4.97	4,469	33,336	0	33,336	1,042.31	33,336	0.77
53	795	7.36	6,624	39,960	0	39,960	1,042.63	39,960	0.92
54	810	7.48	6,734	46,694	0	46,694	1,042.95	46,694	1.07
55	825	2.61	2,348	49,042	0	49,042	1,043.05	49,042	1.13
56	840	2.73	2,455	51,498	0	51,498	1,043.15	51,498	1.18
57	855	4.66	4,196	55,694	0	55,694	1,043.31	55,694	1.28
58	870	4.32	3,891	59,585	0	59,585	1,043.47	59,585	1.37

Developed Retention
TKC JOB # 2.016E+09
100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	TIME (min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	BALANCE IN BASIN (acre-ft)
59	885	4.44	3,994	63,579	0	63,579	1,043.63	63,579	1.46
60	900	4.10	3,687	67,267	0	67,267	1,043.77	67,267	1.54
61	915	3.75	3,379	70,645	0	70,645	1,043.91	70,645	1.62
62	930	3.41	3,068	73,713	0	73,713	1,044.02	73,713	1.69
63	945	1.70	1,531	75,244	0	75,244	1,044.08	75,244	1.73
64	960	1.81	1,626	76,870	0	76,870	1,044.13	76,870	1.76
65	975	0.18	163	77,033	0	77,033	1,044.14	77,033	1.77
66	990	0.18	163	77,197	0	77,197	1,044.14	77,197	1.77
67	1005	0.14	123	77,319	0	77,319	1,044.15	77,319	1.78
68	1020	0.14	123	77,442	0	77,442	1,044.15	77,442	1.78
69	1035	0.23	204	77,646	0	77,646	1,044.16	77,646	1.78
70	1050	0.23	204	77,851	0	77,851	1,044.16	77,851	1.79
71	1065	0.23	204	78,055	0	78,055	1,044.17	78,055	1.79
72	1080	0.18	163	78,218	0	78,218	1,044.18	78,218	1.80
73	1095	0.18	163	78,382	0	78,382	1,044.18	78,382	1.80
74	1110	0.18	163	78,545	0	78,545	1,044.19	78,545	1.80
75	1125	0.14	123	78,668	0	78,668	1,044.19	78,668	1.81
76	1140	0.09	82	78,750	0	78,750	1,044.19	78,750	1.81
77	1155	0.14	123	78,872	0	78,872	1,044.20	78,872	1.81
78	1170	0.18	163	79,036	0	79,036	1,044.20	79,036	1.81
79	1185	0.14	123	79,158	0	79,158	1,044.21	79,158	1.82
80	1200	0.09	82	79,240	0	79,240	1,044.21	79,240	1.82
81	1215	0.14	123	79,362	0	79,362	1,044.21	79,362	1.82
82	1230	0.14	123	79,485	0	79,485	1,044.22	79,485	1.82
83	1245	0.14	123	79,608	0	79,608	1,044.22	79,608	1.83
84	1260	0.09	82	79,689	0	79,689	1,044.23	79,689	1.83
85	1275	0.14	123	79,812	0	79,812	1,044.23	79,812	1.83
86	1290	0.09	82	79,894	0	79,894	1,044.23	79,894	1.83
87	1305	0.14	123	80,016	0	80,016	1,044.24	80,016	1.84
88	1320	0.09	82	80,098	0	80,098	1,044.24	80,098	1.84
89	1335	0.14	123	80,220	0	80,220	1,044.24	80,220	1.84
90	1350	0.09	82	80,302	0	80,302	1,044.25	80,302	1.84
91	1365	0.09	82	80,384	0	80,384	1,044.25	80,384	1.85
92	1380	0.09	82	80,466	0	80,466	1,044.25	80,466	1.85
93	1395	0.09	82	80,547	0	80,547	1,044.25	80,547	1.85
94	1410	0.09	82	80,629	0	80,629	1,044.26	80,629	1.85
95	1425	0.09	82	80,711	0	80,711	1,044.26	80,711	1.85
96	1440	0.09	82	80,793	0	80,793	1,044.26	80,793	1.85

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	DCR		
5				
6	PROJECT NAME	SENTINEL POWER STATION		
7	TKC JOB #	2016105300		
8				
9	CONCENTRATION POINT DESIGNATION	Historic Retention		
10	AREA DESIGNATION	Basin A		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING	22.7		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	2200		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	350		
30				
31	ELEVATION OF HEADWATER	1125		
32	ELEVATION OF CONCENTRATION POINT	1045		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.035		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	2.2		
40	6-HOUR	2.75		
41	24-HOUR	5		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	4		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT: SENTINEL POWER STATION		
BASIC DATA CALCULATION FORM	TKC JOB # 2016105300		
SHORTCUT METHOD	BY DCR	DATE	6/19/2007

PHYSICAL DATA

[1] CONCENTRATION POINT	Historic Retention
[2] AREA DESIGNATION	Basin A
[3] AREA - ACRES	22.700
[4] L-FEET	2200
[5] L-MILES	0.417
[6] La-FEET	350.00
[7] La-MILES	0.066
[8] ELEVATION OF HEADWATER	1125
[9] ELEVATION OF CONCENTRATION POINT	1045
[10] H-FEET	80
[11] S-FEET/MILE	192.0
[12] S^0.5	13.86
[13] L*LCA/S^0.5	0.002
[14] AVERAGE MANNINGS 'N'	0.035
[15] LAG TIME-HOURS	0.08
[16] LAG TIME-MINUTES	4.7
[17] 100% OF LAG-MINUTES	4.7
[18] 200% OF LAG-MINUTES	9.5
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
2.20	22.700	1.00	2.20	2.75	22.700	1.00	2.75	5.00	22.700	1.00	5.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	22.7	SUM [7]	2.20	SUM [9]	22.70	SUM [11]	2.75	SUM [13]	22.70	SUM [15]	5.00
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			2.20				2.75				5.00

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.59	0.52	0.49
FLOOD VOLUME	(cu-ft)	49,007	42,836	39,966
	(acre-ft)	1.13	0.98	0.92
REQUIRED STORAGE	(cu-ft)	48,602	42,481	39,636
	(acre-ft)	1.12	0.98	0.91
PEAK FLOW	(cfs)	32.34	25.15	1.32
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT SENTINEL POWER STATION
CONCENTRATION POINT: Historic Retention
BY DCR DATE 6/19/2007

AVERAGE ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.00	0.000	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	22.70	1.000	0.7400
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	22.7	SUM	0.7400

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.37

C= 0.00685

Ft=C(24-(T/60))^1.55 = 0.00685 (24-(T/60))^1.55 + 0.37 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: SENTINEL POWER STATION
CONCENTRATION POINT: Historic Retention
BY: DCR DATE 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.70
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	4.75
UNIT TIME-PERCENT OF LAG	105.4
TOTAL ADJUSTED STORM RAIN-INCHES	2.20
CONSTANT LOSS RATE-in/hr	0.74
LOW LOSS RATE - PERCENT	90%
TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.343	0.74	0.31	0.03	0.78	233.72
2	10	0.17	1.3	0.343	0.74	0.31	0.03	0.78	233.72
3	15	0.25	1.1	0.290	0.74	0.26	0.03	0.66	197.76
4	20	0.33	1.5	0.396	0.74	0.36	0.04	0.90	269.68
5	25	0.42	1.5	0.396	0.74	0.36	0.04	0.90	269.68
6	30	0.50	1.8	0.475	0.74	0.43	0.05	1.08	323.61
7	35	0.58	1.5	0.396	0.74	0.36	0.04	0.90	269.68
8	40	0.67	1.8	0.475	0.74	0.43	0.05	1.08	323.61
9	45	0.75	1.8	0.475	0.74	0.43	0.05	1.08	323.61
10	50	0.83	1.5	0.396	0.74	0.36	0.04	0.90	269.68
11	55	0.92	1.6	0.422	0.74	0.38	0.04	0.96	287.65
12	60	1.00	1.8	0.475	0.74	0.43	0.05	1.08	323.61
13	65	1.08	2.2	0.581	0.74	0.52	0.06	1.32	395.52
14	70	1.17	2.2	0.581	0.74	0.52	0.06	1.32	395.52
15	75	1.25	2.2	0.581	0.74	0.52	0.06	1.32	395.52
16	80	1.33	2.0	0.528	0.74	0.48	0.05	1.20	359.57
17	85	1.42	2.6	0.686	0.74	0.62	0.07	1.56	467.44
18	90	1.50	2.7	0.713	0.74	0.64	0.07	1.62	485.42
19	95	1.58	2.4	0.634	0.74	0.57	0.06	1.44	431.48
20	100	1.67	2.7	0.713	0.74	0.64	0.07	1.62	485.42
21	105	1.75	3.3	0.871	0.74	0.78	0.13	2.98	893.47
22	110	1.83	3.1	0.818	0.74	0.74	0.08	1.78	533.90
23	115	1.92	2.9	0.766	0.74	0.69	0.03	0.58	174.34
24	120	2.00	3.0	0.792	0.74	0.71	0.05	1.18	354.12
25	125	2.08	3.1	0.818	0.74	0.74	0.08	1.78	533.90
26	130	2.17	4.2	1.109	0.74	1.00	0.37	8.37	2511.53
27	135	2.25	5.0	1.320	0.74	1.19	0.58	13.17	3949.80
28	140	2.33	3.5	0.924	0.74	0.83	0.18	4.18	1253.04
29	145	2.42	6.8	1.795	0.74	1.62	1.06	23.95	7185.91
30	150	2.50	7.3	1.927	0.74	1.73	1.19	26.95	8084.83
31	155	2.58	8.2	2.165	0.74	1.95	1.42	32.34	9702.89
32	160	2.67	5.9	1.558	0.74	1.40	0.82	18.56	5567.86
33	165	2.75	2.0	0.528	0.74	0.48	0.05	1.20	359.57
34	170	2.83	1.8	0.475	0.74	0.43	0.05	1.08	323.61
35	175	2.92	1.8	0.475	0.74	0.43	0.05	1.08	323.61
36	180	3.00	0.6	0.158	0.74	0.14	0.02	0.36	107.87

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.59
FLOOD VOLUME (acft)	1.13
FLOOD VOLUME (cuft)	49007.36
REQUIRED STORAGE (acft)	1.12
REQUIRED STORAGE (cuft)	48602.15
PEAK FLOW RATE (cfs)	32.34

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Historic Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.70		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	4.75		
UNIT TIME-PERCENT OF LAG	105.4		
TOTAL ADJUSTED STORM RAIN-INCHES	2.75		
CONSTANT LOSS RATE-in/hr	0.740		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	0.5	0.165	0.74	0.15	0.02	0.37	112.37
2	10	0.17	0.6	0.198	0.74	0.18	0.02	0.45	134.84
3	15	0.25	0.6	0.198	0.74	0.18	0.02	0.45	134.84
4	20	0.33	0.6	0.198	0.74	0.18	0.02	0.45	134.84
5	25	0.42	0.6	0.198	0.74	0.18	0.02	0.45	134.84
6	30	0.50	0.7	0.231	0.74	0.21	0.02	0.52	157.31
7	35	0.58	0.7	0.231	0.74	0.21	0.02	0.52	157.31
8	40	0.67	0.7	0.231	0.74	0.21	0.02	0.52	157.31
9	45	0.75	0.7	0.231	0.74	0.21	0.02	0.52	157.31
10	50	0.83	0.7	0.231	0.74	0.21	0.02	0.52	157.31
11	55	0.92	0.7	0.231	0.74	0.21	0.02	0.52	157.31
12	60	1.00	0.8	0.264	0.74	0.24	0.03	0.60	179.78
13	65	1.08	0.8	0.264	0.74	0.24	0.03	0.60	179.78
14	70	1.17	0.8	0.264	0.74	0.24	0.03	0.60	179.78
15	75	1.25	0.8	0.264	0.74	0.24	0.03	0.60	179.78
16	80	1.33	0.8	0.264	0.74	0.24	0.03	0.60	179.78
17	85	1.42	0.8	0.264	0.74	0.24	0.03	0.60	179.78
18	90	1.50	0.8	0.264	0.74	0.24	0.03	0.60	179.78
19	95	1.58	0.8	0.264	0.74	0.24	0.03	0.60	179.78
20	100	1.67	0.8	0.264	0.74	0.24	0.03	0.60	179.78
21	105	1.75	0.8	0.264	0.74	0.24	0.03	0.60	179.78
22	110	1.83	0.8	0.264	0.74	0.24	0.03	0.60	179.78
23	115	1.92	0.8	0.264	0.74	0.24	0.03	0.60	179.78
24	120	2.00	0.9	0.297	0.74	0.27	0.03	0.67	202.26
25	125	2.08	0.8	0.264	0.74	0.24	0.03	0.60	179.78
26	130	2.17	0.9	0.297	0.74	0.27	0.03	0.67	202.26
27	135	2.25	0.9	0.297	0.74	0.27	0.03	0.67	202.26
28	140	2.33	0.9	0.297	0.74	0.27	0.03	0.67	202.26
29	145	2.42	0.9	0.297	0.74	0.27	0.03	0.67	202.26
30	150	2.50	0.9	0.297	0.74	0.27	0.03	0.67	202.26
31	155	2.58	0.9	0.297	0.74	0.27	0.03	0.67	202.26
32	160	2.67	0.9	0.297	0.74	0.27	0.03	0.67	202.26
33	165	2.75	1.0	0.330	0.74	0.30	0.03	0.75	224.73
34	170	2.83	1.0	0.330	0.74	0.30	0.03	0.75	224.73
35	175	2.92	1.0	0.330	0.74	0.30	0.03	0.75	224.73
36	180	3.00	1.0	0.330	0.74	0.30	0.03	0.75	224.73
37	185	3.08	1.0	0.330	0.74	0.30	0.03	0.75	224.73
38	190	3.17	1.1	0.363	0.74	0.33	0.04	0.82	247.20
39	195	3.25	1.1	0.363	0.74	0.33	0.04	0.82	247.20
40	200	3.33	1.1	0.363	0.74	0.33	0.04	0.82	247.20
41	205	3.42	1.2	0.396	0.74	0.36	0.04	0.90	269.68
42	210	3.50	1.3	0.429	0.74	0.39	0.04	0.97	292.15
43	215	3.58	1.4	0.462	0.74	0.42	0.05	1.05	314.62
44	220	3.67	1.4	0.462	0.74	0.42	0.05	1.05	314.62
45	225	3.75	1.5	0.495	0.74	0.45	0.05	1.12	337.10
46	230	3.83	1.5	0.495	0.74	0.45	0.05	1.12	337.10
47	235	3.92	1.6	0.528	0.74	0.48	0.05	1.20	359.57
48	240	4.00	1.6	0.528	0.74	0.48	0.05	1.20	359.57
49	245	4.08	1.7	0.561	0.74	0.50	0.06	1.27	382.04
50	250	4.17	1.8	0.594	0.74	0.53	0.06	1.35	404.51
51	255	4.25	1.9	0.627	0.74	0.56	0.06	1.42	426.99
52	260	4.33	2.0	0.660	0.74	0.59	0.07	1.50	449.46
53	265	4.42	2.1	0.693	0.74	0.62	0.07	1.57	471.93
54	270	4.50	2.1	0.693	0.74	0.62	0.07	1.57	471.93
55	275	4.58	2.2	0.726	0.74	0.65	0.07	1.65	494.41
56	280	4.67	2.3	0.759	0.74	0.68	0.02	0.43	129.39

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Historic Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.70		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	4.75		
UNIT TIME-PERCENT OF LAG	105.4		
TOTAL ADJUSTED STORM RAIN-INCHES	2.75		
CONSTANT LOSS RATE-in/hr	0.740		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
57	285	4.75	2.4	0.792	0.74	0.71	0.05	1.18	354.12
58	290	4.83	2.4	0.792	0.74	0.71	0.05	1.18	354.12
59	295	4.92	2.5	0.825	0.74	0.74	0.09	1.93	578.85
60	300	5.00	2.6	0.858	0.74	0.77	0.12	2.68	803.58
61	305	5.08	3.1	1.023	0.74	0.92	0.28	6.42	1927.23
62	310	5.17	3.6	1.188	0.74	1.07	0.45	10.17	3050.88
63	315	5.25	3.9	1.287	0.74	1.16	0.55	12.42	3725.07
64	320	5.33	4.2	1.386	0.74	1.25	0.65	14.66	4399.26
65	325	5.42	4.7	1.551	0.74	1.40	0.81	18.41	5522.91
66	330	5.50	5.6	1.848	0.74	1.66	1.11	25.15	7545.48
67	335	5.58	1.9	0.627	0.74	0.56	0.06	1.42	426.99
68	340	5.67	0.9	0.297	0.74	0.27	0.03	0.67	202.26
69	345	5.75	0.6	0.198	0.74	0.18	0.02	0.45	134.84
70	350	5.83	0.5	0.165	0.74	0.15	0.02	0.37	112.37
71	355	5.92	0.3	0.099	0.74	0.09	0.01	0.22	67.42
72	360	6.00	0.2	0.066	0.74	0.06	0.01	0.15	44.95

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.52
FLOOD VOLUME (acft)	0.98
FLOOD VOLUME (cuft)	42835.64
REQUIRED STORAGE (acft)	0.98
REQUIRED STORAGE (cuft)	42481.46
PEAK FLOW RATE (cfs)	25.15

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: SENTINEL POWER STATION
CONCENTRATION POINT: Historic Retention
BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.700	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.7400
LAG TIME - MINUTES	4.75	MINIMUM LOSS RATE (for var. loss) - in/hr	0.370
UNIT TIME-PERCENT OF LAG	316.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	5.00	C	0.00685
		PERCOLATION RATE (cfs)	0.00

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	15	0.25	0.2	0.040	1.307	0.036	0.004	0.09	81.72
2	30	0.50	0.3	0.060	1.292	0.054	0.006	0.14	122.58
3	45	0.75	0.3	0.060	1.277	0.054	0.006	0.14	122.58
4	60	1.00	0.4	0.080	1.262	0.072	0.008	0.18	163.44
5	75	1.25	0.3	0.060	1.247	0.054	0.006	0.14	122.58
6	90	1.50	0.3	0.060	1.232	0.054	0.006	0.14	122.58
7	105	1.75	0.3	0.060	1.217	0.054	0.006	0.14	122.58
8	120	2.00	0.4	0.080	1.202	0.072	0.008	0.18	163.44
9	135	2.25	0.4	0.080	1.188	0.072	0.008	0.18	163.44
10	150	2.50	0.4	0.080	1.174	0.072	0.008	0.18	163.44
11	165	2.75	0.5	0.100	1.159	0.090	0.010	0.23	204.30
12	180	3.00	0.5	0.100	1.145	0.090	0.010	0.23	204.30
13	195	3.25	0.5	0.100	1.131	0.090	0.010	0.23	204.30
14	210	3.50	0.5	0.100	1.117	0.090	0.010	0.23	204.30
15	225	3.75	0.5	0.100	1.103	0.090	0.010	0.23	204.30
16	240	4.00	0.6	0.120	1.089	0.108	0.012	0.27	245.16
17	255	4.25	0.6	0.120	1.075	0.108	0.012	0.27	245.16
18	270	4.50	0.7	0.140	1.061	0.126	0.014	0.32	286.02
19	285	4.75	0.7	0.140	1.048	0.126	0.014	0.32	286.02
20	300	5.00	0.8	0.160	1.034	0.144	0.016	0.36	326.88
21	315	5.25	0.6	0.120	1.021	0.108	0.012	0.27	245.16
22	330	5.50	0.7	0.140	1.007	0.126	0.014	0.32	286.02
23	345	5.75	0.8	0.160	0.994	0.144	0.016	0.36	326.88
24	360	6.00	0.8	0.160	0.981	0.144	0.016	0.36	326.88
25	375	6.25	0.9	0.180	0.968	0.162	0.018	0.41	367.74
26	390	6.50	0.9	0.180	0.955	0.162	0.018	0.41	367.74
27	405	6.75	1.0	0.200	0.942	0.180	0.020	0.45	408.60
28	420	7.00	1.0	0.200	0.930	0.180	0.020	0.45	408.60
29	435	7.25	1.0	0.200	0.917	0.180	0.020	0.45	408.60
30	450	7.50	1.1	0.220	0.905	0.198	0.022	0.50	449.46
31	465	7.75	1.2	0.240	0.892	0.216	0.024	0.54	490.32
32	480	8.00	1.3	0.260	0.880	0.234	0.026	0.59	531.18
33	495	8.25	1.5	0.300	0.868	0.270	0.030	0.68	612.90
34	510	8.50	1.5	0.300	0.856	0.270	0.030	0.68	612.90
35	525	8.75	1.6	0.320	0.844	0.288	0.032	0.73	653.76
36	540	9.00	1.7	0.340	0.832	0.306	0.034	0.77	694.62
37	555	9.25	1.9	0.380	0.820	0.342	0.038	0.86	776.34
38	570	9.50	2.0	0.400	0.808	0.360	0.040	0.91	817.20
39	585	9.75	2.1	0.420	0.797	0.378	0.042	0.95	858.06
40	600	10.00	2.2	0.440	0.785	0.396	0.044	1.00	898.92
41	615	10.25	1.5	0.300	0.774	0.270	0.030	0.68	612.90
42	630	10.50	1.5	0.300	0.763	0.270	0.030	0.68	612.90
43	645	10.75	2.0	0.400	0.752	0.360	0.040	0.91	817.20
44	660	11.00	2.0	0.400	0.741	0.360	0.040	0.91	817.20
45	675	11.25	1.9	0.380	0.730	0.342	0.038	0.86	776.34
46	690	11.50	1.9	0.380	0.719	0.342	0.038	0.86	776.34
47	705	11.75	1.7	0.340	0.708	0.306	0.034	0.77	694.62
48	720	12.00	1.8	0.360	0.698	0.324	0.036	0.82	735.48
49	735	12.25	2.5	0.500	0.687	0.450	0.050	1.14	1021.50
50	750	12.50	2.6	0.520	0.677	0.468	0.052	1.18	1062.36
51	765	12.75	2.8	0.560	0.667	0.504	0.056	1.27	1144.08
52	780	13.00	2.9	0.580	0.657	0.522	0.058	1.32	1184.94
53	795	13.25	3.4	0.680	0.647	0.612	0.033	0.75	676.88
54	810	13.50	3.4	0.680	0.637	0.612	0.043	0.97	877.15
55	825	13.75	2.3	0.460	0.627	0.414	0.046	1.04	939.78
56	840	14.00	2.3	0.460	0.618	0.414	0.046	1.04	939.78
57	855	14.25	2.7	0.540	0.608	0.486	0.054	1.23	1103.22
58	870	14.50	2.6	0.520	0.599	0.468	0.052	1.18	1062.36
59	885	14.75	2.6	0.520	0.590	0.468	0.052	1.18	1062.36
60	900	15.00	2.5	0.500	0.581	0.450	0.050	1.14	1021.50

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: SENTINEL POWER STATION CONCENTRATION POINT: Historic Retention BY: DCR DATE: 6/19/2007

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	22.700	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.7400
LAG TIME - MINUTES	4.75	MINIMUM LOSS RATE (for var. loss) - in/hr	0.370
UNIT TIME-PERCENT OF LAG	316.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	5.00	C	0.00685
		PERCOLATION RATE (cfs)	0.00

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
61	915	15.25	2.4	0.480	0.572	0.432	0.048	1.09	980.64
62	930	15.50	2.3	0.460	0.563	0.414	0.046	1.04	939.78
63	945	15.75	1.9	0.380	0.555	0.342	0.038	0.86	776.34
64	960	16.00	1.9	0.380	0.546	0.342	0.038	0.86	776.34
65	975	16.25	0.4	0.080	0.538	0.072	0.008	0.18	163.44
66	990	16.50	0.4	0.080	0.530	0.072	0.008	0.18	163.44
67	1005	16.75	0.3	0.060	0.522	0.054	0.006	0.14	122.58
68	1020	17.00	0.3	0.060	0.514	0.054	0.006	0.14	122.58
69	1035	17.25	0.5	0.100	0.506	0.090	0.010	0.23	204.30
70	1050	17.50	0.5	0.100	0.498	0.090	0.010	0.23	204.30
71	1065	17.75	0.5	0.100	0.491	0.090	0.010	0.23	204.30
72	1080	18.00	0.4	0.080	0.484	0.072	0.008	0.18	163.44
73	1095	18.25	0.4	0.080	0.477	0.072	0.008	0.18	163.44
74	1110	18.50	0.4	0.080	0.470	0.072	0.008	0.18	163.44
75	1125	18.75	0.3	0.060	0.463	0.054	0.006	0.14	122.58
76	1140	19.00	0.2	0.040	0.456	0.036	0.004	0.09	81.72
77	1155	19.25	0.3	0.060	0.450	0.054	0.006	0.14	122.58
78	1170	19.50	0.4	0.080	0.444	0.072	0.008	0.18	163.44
79	1185	19.75	0.3	0.060	0.438	0.054	0.006	0.14	122.58
80	1200	20.00	0.2	0.040	0.432	0.036	0.004	0.09	81.72
81	1215	20.25	0.3	0.060	0.426	0.054	0.006	0.14	122.58
82	1230	20.50	0.3	0.060	0.420	0.054	0.006	0.14	122.58
83	1245	20.75	0.3	0.060	0.415	0.054	0.006	0.14	122.58
84	1260	21.00	0.2	0.040	0.410	0.036	0.004	0.09	81.72
85	1275	21.25	0.3	0.060	0.405	0.054	0.006	0.14	122.58
86	1290	21.50	0.2	0.040	0.401	0.036	0.004	0.09	81.72
87	1305	21.75	0.3	0.060	0.396	0.054	0.006	0.14	122.58
88	1320	22.00	0.2	0.040	0.392	0.036	0.004	0.09	81.72
89	1335	22.25	0.3	0.060	0.388	0.054	0.006	0.14	122.58
90	1350	22.50	0.2	0.040	0.385	0.036	0.004	0.09	81.72
91	1365	22.75	0.2	0.040	0.381	0.036	0.004	0.09	81.72
92	1380	23.00	0.2	0.040	0.378	0.036	0.004	0.09	81.72
93	1395	23.25	0.2	0.040	0.376	0.036	0.004	0.09	81.72
94	1410	23.50	0.2	0.040	0.373	0.036	0.004	0.09	81.72
95	1425	23.75	0.2	0.040	0.371	0.038	0.004	0.09	81.72
96	1440	24.00	0.2	0.040	0.370	0.036	0.004	0.09	81.72

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.49
FLOOD VOLUME (acft)	0.92
FLOOD VOLUME (cuft)	39966.00
REQUIRED STORAGE (acft)	0.91
REQUIRED STORAGE (cuft)	39635.55
PEAK FLOW (cfs)	1.32

PROJECT: SENTINEL POWER STATION
TKC JOB # 2016105300
Historic Retention

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS

PERCOLATION RATE	4 in/hr	0.00 cfs

MAXWELL IV DRYWELLS

NUMBER USED	0	
RATE/DRYWELL	0 cfs	
TOTAL DISSIPATED		0 cfs
TOTAL PERCOLATION RATE		0.00 cfs

Historic Retention
TKC JOB # 2016105300
100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.78	234	234	0	234	-	234	0.01
2	10	0.78	234	467	0	467	-	467	0.01
3	15	0.66	198	665	0	665	-	665	0.02
4	20	0.90	270	935	0	935	-	935	0.02
5	25	0.90	270	1,205	0	1,205	-	1,205	0.03
6	30	1.08	324	1,528	0	1,528	-	1,528	0.04
7	35	0.90	270	1,798	0	1,798	-	1,798	0.04
8	40	1.08	324	2,121	0	2,121	-	2,121	0.05
9	45	1.08	324	2,445	0	2,445	-	2,445	0.06
10	50	0.90	270	2,715	0	2,715	-	2,715	0.06
11	55	0.96	288	3,002	0	3,002	-	3,002	0.07
12	60	1.08	324	3,326	0	3,326	-	3,326	0.08
13	65	1.32	396	3,722	0	3,722	-	3,722	0.09
14	70	1.32	396	4,117	0	4,117	-	4,117	0.09
15	75	1.32	396	4,513	0	4,513	-	4,513	0.10
16	80	1.20	360	4,872	0	4,872	-	4,872	0.11
17	85	1.56	467	5,340	0	5,340	-	5,340	0.12
18	90	1.62	485	5,825	0	5,825	-	5,825	0.13
19	95	1.44	431	6,256	0	6,256	-	6,256	0.14
20	100	1.62	485	6,742	0	6,742	-	6,742	0.15
21	105	2.98	893	7,635	0	7,635	-	7,635	0.18
22	110	1.78	534	8,169	0	8,169	-	8,169	0.19
23	115	0.58	174	8,344	0	8,344	-	8,344	0.19
24	120	1.18	354	8,698	0	8,698	-	8,698	0.20
25	125	1.78	534	9,232	0	9,232	-	9,232	0.21
26	130	8.37	2,512	11,743	0	11,743	-	11,743	0.27
27	135	13.17	3,950	15,693	0	15,693	-	15,693	0.36
28	140	4.18	1,253	16,946	0	16,946	-	16,946	0.39
29	145	23.95	7,186	24,132	0	24,132	-	24,132	0.55
30	150	26.95	8,085	32,217	0	32,217	-	32,217	0.74
31	155	32.34	9,703	41,920	0	41,920	-	41,920	0.96
32	160	18.56	5,568	47,487	0	47,487	-	47,487	1.09
33	165	1.20	360	47,847	0	47,847	-	47,847	1.10
34	170	1.08	324	48,171	0	48,171	-	48,171	1.11
35	175	1.08	324	48,494	0	48,494	-	48,494	1.11
36	180	0.36	108	48,602	0	48,602	-	48,602	1.12

Historic Retention
TKC JOB # 2016105300
100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	TIME (min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	BALANCE IN BASIN (acre-ft)
1	5	0.37	112	112	0	112	-	112	0.00
2	10	0.45	135	247	0	247	-	247	0.01
3	15	0.45	135	382	0	382	-	382	0.01
4	20	0.45	135	517	0	517	-	517	0.01
5	25	0.45	135	652	0	652	-	652	0.01
6	30	0.52	157	809	0	809	-	809	0.02
7	35	0.52	157	966	0	966	-	966	0.02
8	40	0.52	157	1,124	0	1,124	-	1,124	0.03
9	45	0.52	157	1,281	0	1,281	-	1,281	0.03
10	50	0.52	157	1,438	0	1,438	-	1,438	0.03
11	55	0.52	157	1,596	0	1,596	-	1,596	0.04
12	60	0.60	180	1,775	0	1,775	-	1,775	0.04
13	65	0.60	180	1,955	0	1,955	-	1,955	0.04
14	70	0.60	180	2,135	0	2,135	-	2,135	0.05
15	75	0.60	180	2,315	0	2,315	-	2,315	0.05
16	80	0.60	180	2,495	0	2,495	-	2,495	0.06
17	85	0.60	180	2,674	0	2,674	-	2,674	0.06
18	90	0.60	180	2,854	0	2,854	-	2,854	0.07
19	95	0.60	180	3,034	0	3,034	-	3,034	0.07
20	100	0.60	180	3,214	0	3,214	-	3,214	0.07
21	105	0.60	180	3,393	0	3,393	-	3,393	0.08
22	110	0.60	180	3,573	0	3,573	-	3,573	0.08
23	115	0.60	180	3,753	0	3,753	-	3,753	0.09
24	120	0.67	202	3,955	0	3,955	-	3,955	0.09
25	125	0.60	180	4,135	0	4,135	-	4,135	0.09
26	130	0.67	202	4,337	0	4,337	-	4,337	0.10
27	135	0.67	202	4,540	0	4,540	-	4,540	0.10
28	140	0.67	202	4,742	0	4,742	-	4,742	0.11
29	145	0.67	202	4,944	0	4,944	-	4,944	0.11
30	150	0.67	202	5,146	0	5,146	-	5,146	0.12
31	155	0.67	202	5,349	0	5,349	-	5,349	0.12
32	160	0.67	202	5,551	0	5,551	-	5,551	0.13
33	165	0.75	225	5,776	0	5,776	-	5,776	0.13
34	170	0.75	225	6,000	0	6,000	-	6,000	0.14
35	175	0.75	225	6,225	0	6,225	-	6,225	0.14
36	180	0.75	225	6,450	0	6,450	-	6,450	0.15
37	185	0.75	225	6,674	0	6,674	-	6,674	0.15
38	190	0.82	247	6,922	0	6,922	-	6,922	0.16
39	195	0.82	247	7,169	0	7,169	-	7,169	0.16
40	200	0.82	247	7,416	0	7,416	-	7,416	0.17
41	205	0.90	270	7,686	0	7,686	-	7,686	0.18
42	210	0.97	292	7,978	0	7,978	-	7,978	0.18
43	215	1.05	315	8,293	0	8,293	-	8,293	0.19
44	220	1.05	315	8,607	0	8,607	-	8,607	0.20
45	225	1.12	337	8,944	0	8,944	-	8,944	0.21
46	230	1.12	337	9,281	0	9,281	-	9,281	0.21
47	235	1.20	360	9,641	0	9,641	-	9,641	0.22
48	240	1.20	360	10,000	0	10,000	-	10,000	0.23
49	245	1.27	382	10,383	0	10,383	-	10,383	0.24
50	250	1.35	405	10,787	0	10,787	-	10,787	0.25
51	255	1.42	427	11,214	0	11,214	-	11,214	0.26
52	260	1.50	449	11,663	0	11,663	-	11,663	0.27
53	265	1.57	472	12,135	0	12,135	-	12,135	0.28
54	270	1.57	472	12,607	0	12,607	-	12,607	0.29
55	275	1.65	494	13,102	0	13,102	-	13,102	0.30

Historic Retention
TKC JOB # 2016105300
100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	0.43	129	13,231	0	13,231	-	13,231	0.30
57	285	1.18	354	13,585	0	13,585	-	13,585	0.31
58	290	1.18	354	13,939	0	13,939	-	13,939	0.32
59	295	1.93	579	14,518	0	14,518	-	14,518	0.33
60	300	2.68	804	15,322	0	15,322	-	15,322	0.35
61	305	6.42	1,927	17,249	0	17,249	-	17,249	0.40
62	310	10.17	3,051	20,300	0	20,300	-	20,300	0.47
63	315	12.42	3,725	24,025	0	24,025	-	24,025	0.55
64	320	14.66	4,399	28,424	0	28,424	-	28,424	0.65
65	325	18.41	5,523	33,947	0	33,947	-	33,947	0.78
66	330	25.15	7,545	41,493	0	41,493	-	41,493	0.95
67	335	1.42	427	41,920	0	41,920	-	41,920	0.96
68	340	0.67	202	42,122	0	42,122	-	42,122	0.97
69	345	0.45	135	42,257	0	42,257	-	42,257	0.97
70	350	0.37	112	42,369	0	42,369	-	42,369	0.97
71	355	0.22	67	42,437	0	42,437	-	42,437	0.97
72	360	0.15	45	42,481	0	42,481	-	42,481	0.98

Historic Retention
TKC JOB # 2.016E+09
100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	TIME (min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	BALANCE IN BASIN (acre-ft)
1	15	0.09	82	82	0	82	-	82	0.00
2	30	0.14	123	204	0	204	-	204	0.00
3	45	0.14	123	327	0	327	-	327	0.01
4	60	0.18	163	490	0	490	-	490	0.01
5	75	0.14	123	613	0	613	-	613	0.01
6	90	0.14	123	735	0	735	-	735	0.02
7	105	0.14	123	858	0	858	-	858	0.02
8	120	0.18	163	1,022	0	1,022	-	1,022	0.02
9	135	0.18	163	1,185	0	1,185	-	1,185	0.03
10	150	0.18	163	1,348	0	1,348	-	1,348	0.03
11	165	0.23	204	1,553	0	1,553	-	1,553	0.04
12	180	0.23	204	1,757	0	1,757	-	1,757	0.04
13	195	0.23	204	1,961	0	1,961	-	1,961	0.05
14	210	0.23	204	2,166	0	2,166	-	2,166	0.05
15	225	0.23	204	2,370	0	2,370	-	2,370	0.05
16	240	0.27	245	2,615	0	2,615	-	2,615	0.06
17	255	0.27	245	2,860	0	2,860	-	2,860	0.07
18	270	0.32	286	3,146	0	3,146	-	3,146	0.07
19	285	0.32	286	3,432	0	3,432	-	3,432	0.08
20	300	0.36	327	3,759	0	3,759	-	3,759	0.09
21	315	0.27	245	4,004	0	4,004	-	4,004	0.09
22	330	0.32	286	4,290	0	4,290	-	4,290	0.10
23	345	0.36	327	4,617	0	4,617	-	4,617	0.11
24	360	0.36	327	4,944	0	4,944	-	4,944	0.11
25	375	0.41	368	5,312	0	5,312	-	5,312	0.12
26	390	0.41	368	5,680	0	5,680	-	5,680	0.13
27	405	0.45	409	6,088	0	6,088	-	6,088	0.14
28	420	0.45	409	6,497	0	6,497	-	6,497	0.15
29	435	0.45	409	6,905	0	6,905	-	6,905	0.16
30	450	0.50	449	7,355	0	7,355	-	7,355	0.17
31	465	0.54	490	7,845	0	7,845	-	7,845	0.18
32	480	0.59	531	8,376	0	8,376	-	8,376	0.19
33	495	0.68	613	8,989	0	8,989	-	8,989	0.21
34	510	0.68	613	9,602	0	9,602	-	9,602	0.22
35	525	0.73	654	10,256	0	10,256	-	10,256	0.24
36	540	0.77	695	10,950	0	10,950	-	10,950	0.25
37	555	0.86	776	11,727	0	11,727	-	11,727	0.27
38	570	0.91	817	12,544	0	12,544	-	12,544	0.29
39	585	0.95	858	13,402	0	13,402	-	13,402	0.31
40	600	1.00	899	14,301	0	14,301	-	14,301	0.33
41	615	0.68	613	14,914	0	14,914	-	14,914	0.34
42	630	0.68	613	15,527	0	15,527	-	15,527	0.36
43	645	0.91	817	16,344	0	16,344	-	16,344	0.38
44	660	0.91	817	17,161	0	17,161	-	17,161	0.39
45	675	0.86	776	17,938	0	17,938	-	17,938	0.41
46	690	0.86	776	18,714	0	18,714	-	18,714	0.43
47	705	0.77	695	19,409	0	19,409	-	19,409	0.45
48	720	0.82	735	20,144	0	20,144	-	20,144	0.46
49	735	1.14	1,022	21,165	0	21,165	-	21,165	0.49
50	750	1.18	1,062	22,228	0	22,228	-	22,228	0.51
51	765	1.27	1,144	23,372	0	23,372	-	23,372	0.54
52	780	1.32	1,185	24,557	0	24,557	-	24,557	0.56
53	795	0.75	677	25,234	0	25,234	-	25,234	0.58
54	810	0.97	877	26,111	0	26,111	-	26,111	0.60
55	825	1.04	940	27,051	0	27,051	-	27,051	0.62
56	840	1.04	940	27,990	0	27,990	-	27,990	0.64
57	855	1.23	1,103	29,094	0	29,094	-	29,094	0.67
58	870	1.18	1,062	30,156	0	30,156	-	30,156	0.69

Historic Retention
TKC JOB # 2.016E+09
100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	1.18	1,062	31,218	0	31,218	-	31,218	0.72
60	900	1.14	1,022	32,240	0	32,240	-	32,240	0.74
61	915	1.09	981	33,221	0	33,221	-	33,221	0.76
62	930	1.04	940	34,160	0	34,160	-	34,160	0.78
63	945	0.86	776	34,937	0	34,937	-	34,937	0.80
64	960	0.86	776	35,713	0	35,713	-	35,713	0.82
65	975	0.18	163	35,876	0	35,876	-	35,876	0.82
66	990	0.18	163	36,040	0	36,040	-	36,040	0.83
67	1005	0.14	123	36,162	0	36,162	-	36,162	0.83
68	1020	0.14	123	36,285	0	36,285	-	36,285	0.83
69	1035	0.23	204	36,489	0	36,489	-	36,489	0.84
70	1050	0.23	204	36,694	0	36,694	-	36,694	0.84
71	1065	0.23	204	36,898	0	36,898	-	36,898	0.85
72	1080	0.18	163	37,061	0	37,061	-	37,061	0.85
73	1095	0.18	163	37,225	0	37,225	-	37,225	0.85
74	1110	0.18	163	37,388	0	37,388	-	37,388	0.86
75	1125	0.14	123	37,511	0	37,511	-	37,511	0.86
76	1140	0.09	82	37,593	0	37,593	-	37,593	0.86
77	1155	0.14	123	37,715	0	37,715	-	37,715	0.87
78	1170	0.18	163	37,879	0	37,879	-	37,879	0.87
79	1185	0.14	123	38,001	0	38,001	-	38,001	0.87
80	1200	0.09	82	38,083	0	38,083	-	38,083	0.87
81	1215	0.14	123	38,205	0	38,205	-	38,205	0.88
82	1230	0.14	123	38,328	0	38,328	-	38,328	0.88
83	1245	0.14	123	38,451	0	38,451	-	38,451	0.88
84	1260	0.09	82	38,532	0	38,532	-	38,532	0.88
85	1275	0.14	123	38,655	0	38,655	-	38,655	0.89
86	1290	0.09	82	38,737	0	38,737	-	38,737	0.89
87	1305	0.14	123	38,859	0	38,859	-	38,859	0.89
88	1320	0.09	82	38,941	0	38,941	-	38,941	0.89
89	1335	0.14	123	39,064	0	39,064	-	39,064	0.90
90	1350	0.09	82	39,145	0	39,145	-	39,145	0.90
91	1365	0.09	82	39,227	0	39,227	-	39,227	0.90
92	1380	0.09	82	39,309	0	39,309	-	39,309	0.90
93	1395	0.09	82	39,390	0	39,390	-	39,390	0.90
94	1410	0.09	82	39,472	0	39,472	-	39,472	0.91
95	1425	0.09	82	39,554	0	39,554	-	39,554	0.91
96	1440	0.09	82	39,636	0	39,636	-	39,636	0.91