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Tanager Energy Storage Project Hydrology Study

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TABLE OF CONTENTS

1.0	Introduction.....	1
1.1	Background	2
1.1.1	Project Setting	2
1.1.2	LECEF Site	5
1.1.3	Proposed Project	7
2.0	Hydrologic Criteria & Methodology	8
2.1	Design Storm Frequency.....	8
2.2	Calculation Methodology.....	8
2.2.1	Modified Rational Method	8
2.2.2	Stormwater Basin and Runoff Volume Analysis	10
3.0	Results and Discussion	12
3.1	Rational Method.....	12
3.2	APWA Modified Rational Method Detention Analysis	12
3.3	HEC-HMS Hydrograph Analysis	12
3.4	Results And Comparison.....	12
3.5	Recommendations.....	13

LIST OF TABLES

Table 2-1.	Summary of Santa Clara County Hydrologic Method Criteria	9
Table 2-2	Runoff Coefficients for Rational Formula	10
Table 3-1.	Tanager and LECEF Hydrology Summary	14

LIST OF FIGURES

Figure 1.	Project Location Map	2
Figure 2.	Mean Annual Precipitation Map.....	3
Figure 3.	Site Hydrologic Soil Groups	4
Figure 4.	FEMA Flood Insurance Rate Map	5
Figure 5.	LECEF Stormwater	6
Figure 6.	Draft Tanager Site Layout	7

APPENDICES

- APPENDIX A – Hydrology Data and Output
- APPENDIX B – Hydrology Exhibits and Topography

TECHNICAL REPORT CERTIFICATION

This Drainage Report has been prepared by NV5, Inc. under the direction of the following Registered Civil Engineer. The undersigned attests to the technical information contained herein and the qualifications of any technical specialist providing engineering data upon which engineering recommendations, conclusions, and decisions are based.



Matthew C. Moore
RCE 56780, Expires 6/30/2027

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1.0 INTRODUCTION

Calpine Corporation (Calpine or Client) is proposing to construct an energy storage facility near 800 Thomas Foon Chew Way, in San Jose, California. The proposed project site is adjacent to the existing Los Esteros Critical Energy Facility (LECEF). Refer to Figure 1 for a project location map. NV5 was retained by Calpine to prepare this preliminary hydrology and drainage study to assist Calpine with sizing proposed drainage facilities, including a proposed stormwater detention basin, and evaluating the impacts of the proposed project on the existing downstream stormwater infrastructure associated with the LECEF. NV5's scope of work includes:

1. Pre-Project Conditions Hydrology: prepare a pre-project (existing conditions) hydrologic study for the site and surrounding area to calculate peak storm flow runoff volumes and rates using City of San Jose and Santa Clara Valley Drainage Manual criteria. This will include evaluation for a 1-inch rainfall storm, the 10- and 100-year storms. The existing condition stormwater operating conditions for the LECEF site will be evaluated, including the collection, conveyance, and storage of stormwater on the LECEF site. This analysis will serve as the baseline for evaluation of potential Tanager Project impacts on the existing LECEF site storm drain infrastructure, and to assist with sizing the proposed Tanager site stormwater basin.
2. Post-Project Conditions Hydrology: prepare a proposed condition hydrologic analysis of the Tanager site and evaluate proposed impacts on the existing LECEF storm drain infrastructure. This will include evaluation of the same storm events as the existing conditions (1-inch, 10-year, and 100-year). This includes evaluation of the proposed stormwater basin. The post-project conditions study will provide recommended detention basin sizing based on local criteria, onsite drainage recommendations, determination of how much, if any, of the Tanager Project can be accommodated with the existing LECEF stormwater infrastructure including the existing 1-million gallon stormwater storage tank.
3. Report and Recommendations: prepare a preliminary level engineering phase report document the results of this study and recommendations for the proposed Tanager site drainage and detention basin sizing, along with evaluation of existing LECEF stormwater infrastructure to accept stormwater runoff from the Tanager site. See below for a description of the existing LECEF stormwater management practices.



Figure 1. Project Location Map

1.1 BACKGROUND

This section provides background information on the project's hydrologic setting and description of the existing stormwater infrastructure and management at the adjacent LECEF site.

1.1.1 Project Setting

The project is located within the City of San Jose, north of Mountain View Alviso Road/State Highway 237, west of Interstate 880 and Coyote Creek. Coyote Creek flows into the San Francisco Bay several miles north of the project.

The regional climate is Mediterranean, generally remaining temperate throughout the year due to the area's geography and proximity to the Pacific Ocean. Temperatures in the Santa Clara Valley range from 35 to 60 degrees Fahrenheit in the winter and 50 to 100 degrees Fahrenheit during the

summer (Santa Clara County, 2007). The average annual precipitation near the project site is approximately 14 to 15 inches (See Figure 2).

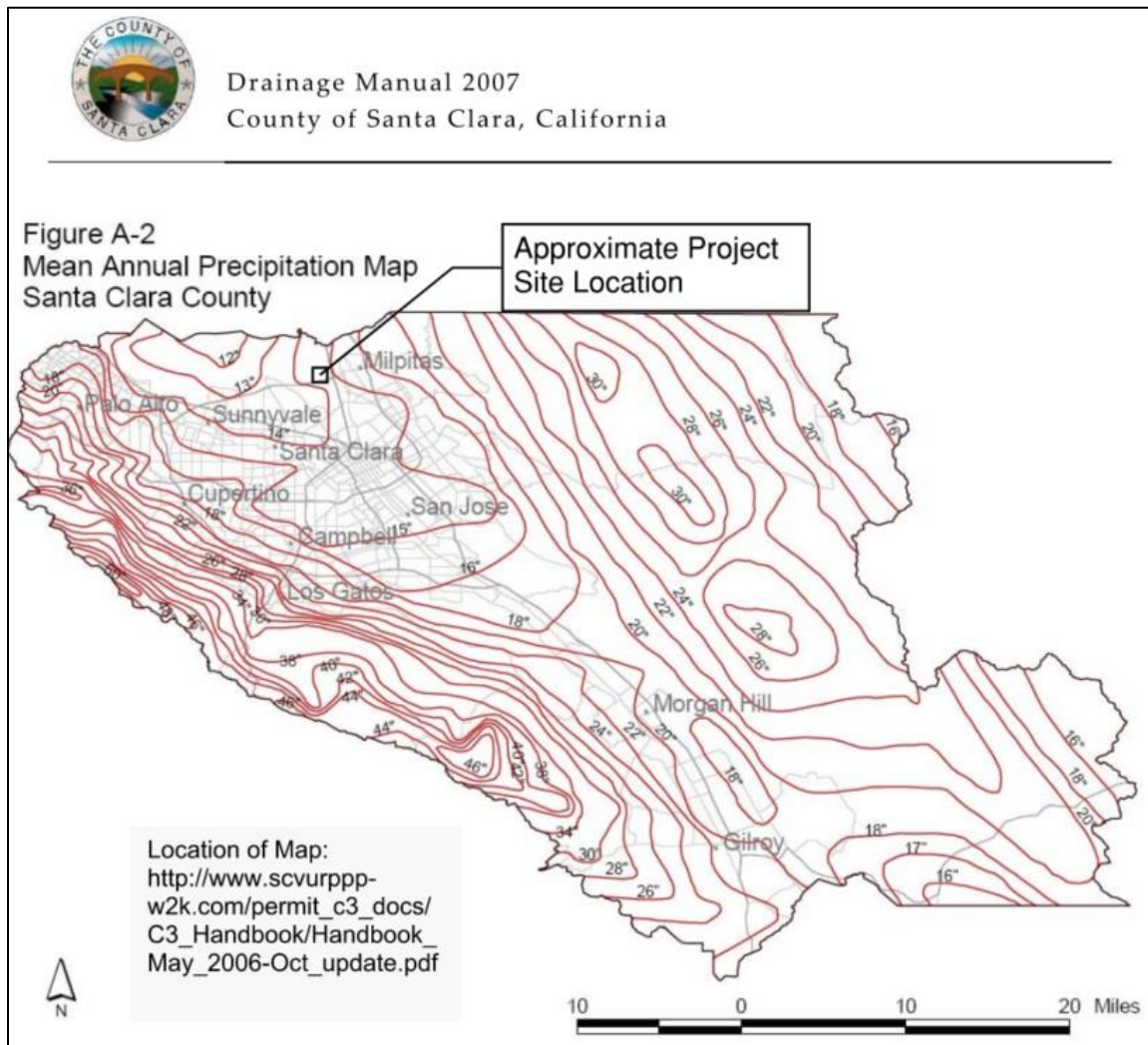


Figure 2. Mean Annual Precipitation Map

The existing site is undeveloped with annual grasses and vegetation and fair to good cover. The topography across the site is relatively flat with an average slope of approximately 1 percent flowing from south to north with typical elevations ranging from approximately 19 feet to 24 feet North Atlantic Vertical Datum 1988 (NAVD88). There is an approximate eight (8) foot high berm (elevation 20 to 28 feet) along the northerly boundary with LECEF. There are four (4) existing area drains (drainage inlets) on the Tanager side of the berm that collect and convey runoff from the Tanager site with pipes through the berm that outlet into a drainage swale within the LECEF. Refer to the site topography maps in Appendix C.

Existing site soils consist primarily of fine sandy loam (Hydrologic Soil Group [HSG] A) on the eastern three-quarters of the site, and fine sandy loam (HSG C) on the remaining western portion of the site.

Soils in HSG A have high infiltration rates, and soils in HSG C have a slow infiltration rate. See Figure 3 for the site hydrologic soil groups.

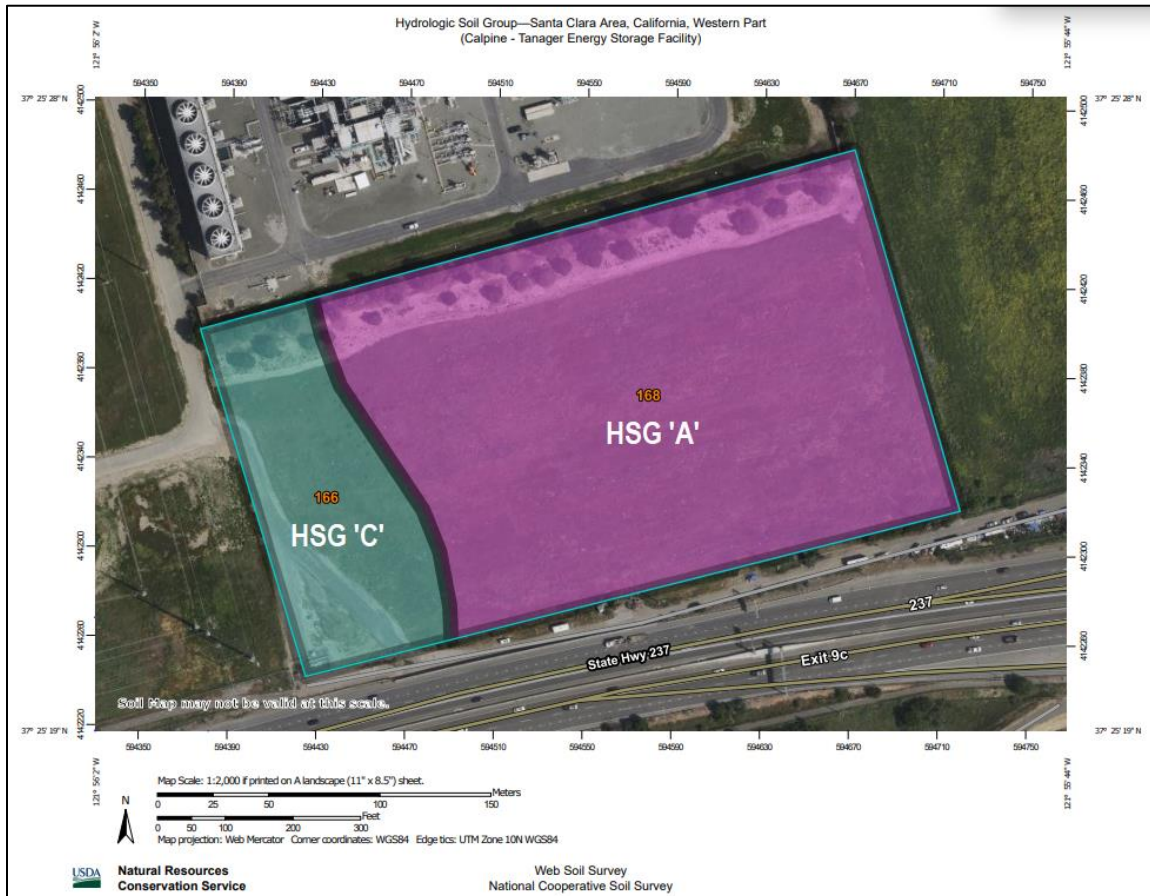


Figure 3. Site Hydrologic Soil Groups

The project is located outside of the 1-percent (100-year) annual chance floodplain designated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Coyote Creek but is located within an area protected from flooding by the 100-year flood by the levee system along Coyote Creek (see Figure 4). Note that the FEMA FIRM panel provides the following notes for this shaded Zone X floodplain area:

- *This area is shown as being protected from the 1-percent annual chance or greater flood hazard by a levee system. Overtopping or failure of any levee system is possible. For Additional information see the 'Accredited Levee Note' in notes to users.*
- *Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures.*

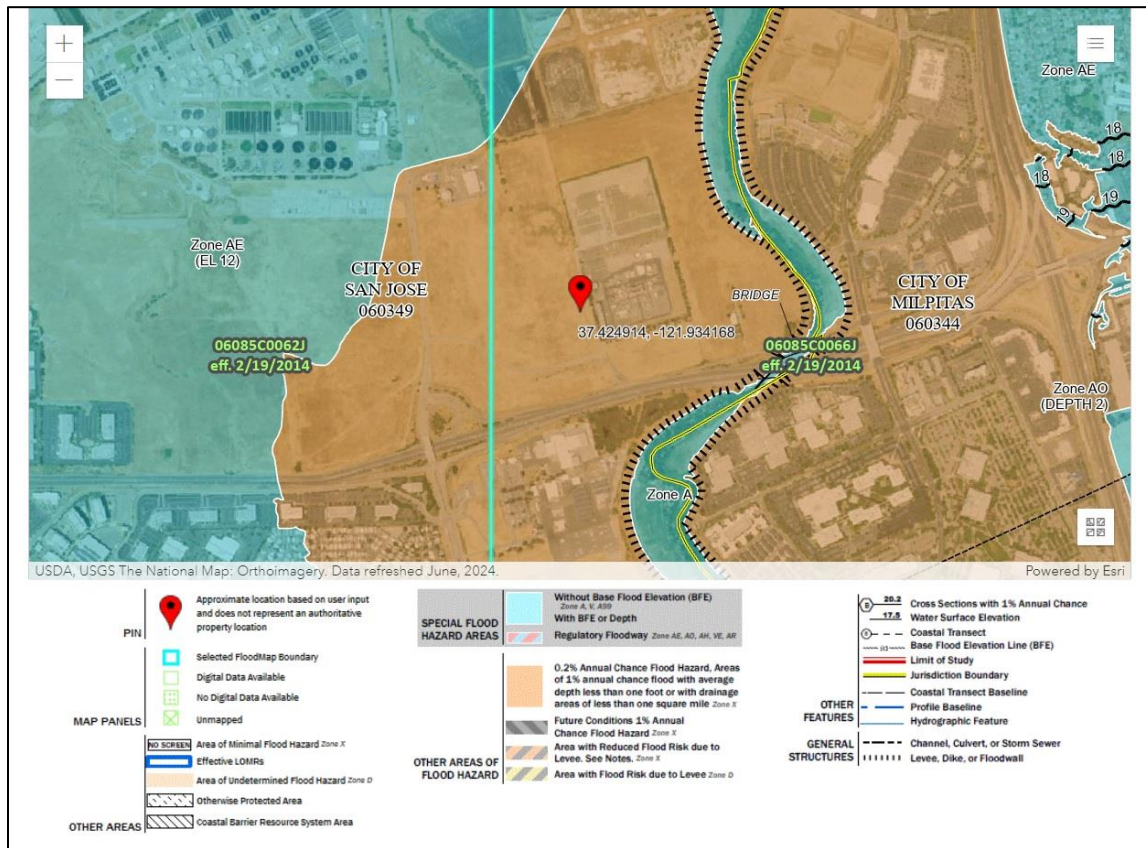


Figure 4. FEMA Flood Insurance Rate Map

1.1.2 LECEF Site

This section describes the drainage patterns, conveyance, and stormwater management at the LECEF site that adjoins the northerly boundary of the project site. The following information was extracted from a memo prepared by NES-EHS for LECEF in response to a Regional Water Quality Control Board inquiry.

The LECEF has active coverage under the California Industrial General Permit (IGP) and was assigned the Waste Discharge Identification Number 2 431017829. The facility retains stormwater onsite in the cooling tower storage tank for reuse. Stormwater is not discharged offsite during normal operating conditions, unless manually directed.

The predominant drainage pattern on site is localized sheet flow to two earthen swales, located at the south and east ends of the facility. Stormwater collected in the swales flows to two (2) interconnected retention sumps, which are approximately 10,500 gallons each. When the retention sumps start to fill, the control room receives a notification. After testing the water, the discharge pumps are then manually released to the cooling tower storage tank for reuse.

The cooling tower storage tank has a maximum capacity of approximately 919,296 gallons. The working capacity is approximately 653,184 gallons (about 2/3 full). If the cooling tower nears the

working capacity, the facility has the ability to discharge from the cooling tower tank to the sanitary sewer. The facility's discharge permit allows a maximum of 379,116 gallons to be discharged to the sewer system daily (equivalent to about 280 gallons per minute [gpm] or 0.587 cubic feet per second [cfs]). This allows the facility to maintain capacity for rainfall usage. If the cooling tower experiences a mechanical issue with the pumps, the water would be pumped to Coyote Creek, at which point a discharge sample would be collected and sent to the laboratory for analysis. The cooling tower pumps have not experienced mechanical issues or been discharged into Coyote Creek since the piping routing the water from the sumps to the cooling tower was installed in 2015. The cooling tower storage tank has the capacity exceeds that of the runoff produced from a 1-inch rainfall event.

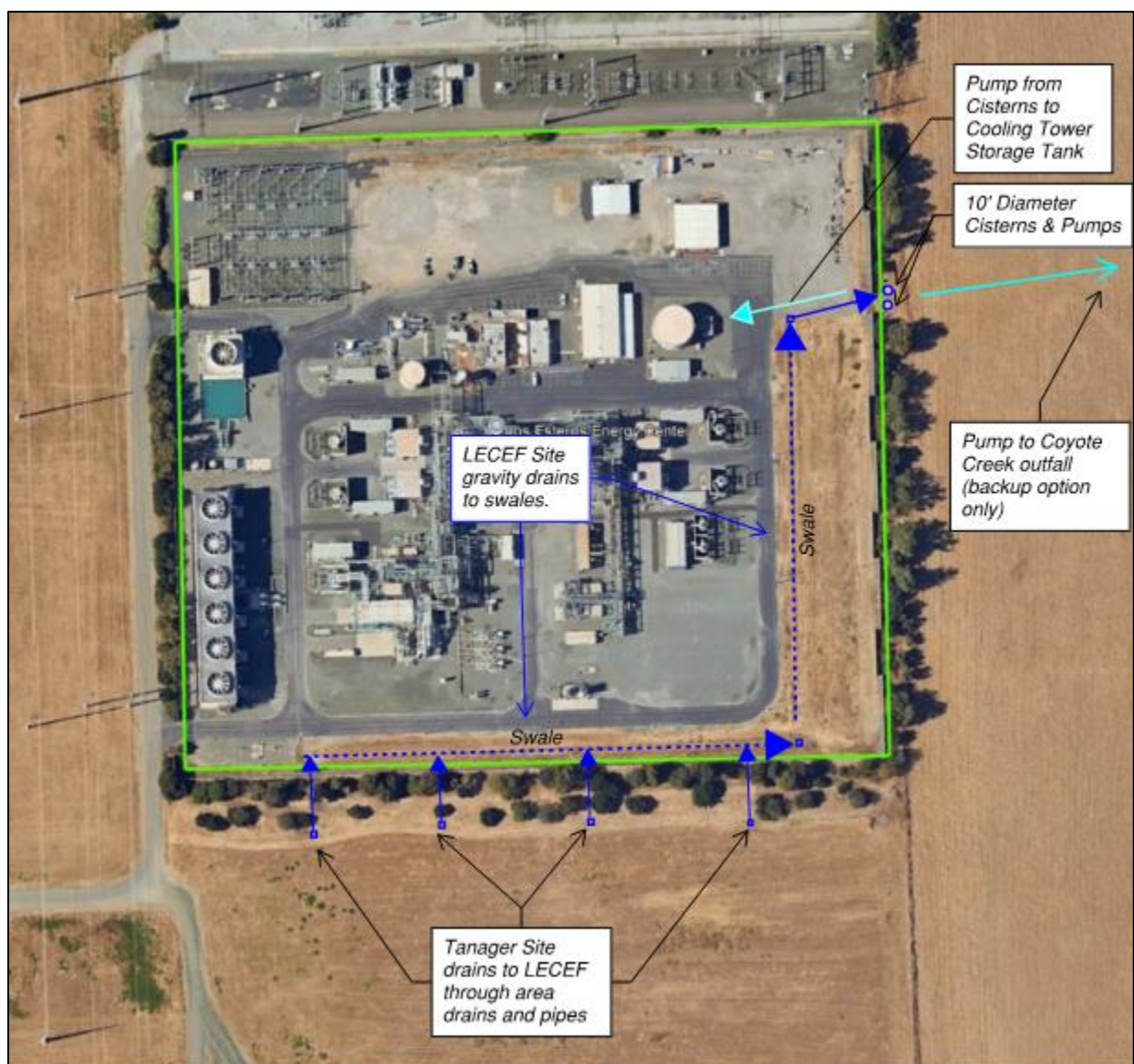


Figure 5. LECEF Stormwater

1.1.3 Proposed Project

The proposed project consists of site development in support of a battery energy storage facility. The site will be cleared and graded with access on the western side of the property near Thomas Foon Chew Way. Site development will occur over approximately 13 acres and include access roads, battery storage infrastructure, electrical and utility infrastructure, and required stormwater/drainage features. For the purposes of this hydrology study, we assume that the batteries will be stored on raised concrete pads, and that the access roads will be impervious. Due to site development, the post development peak runoff flow rate and volume will increase. Therefore, proposed drainage features will be proposed to safely collect and convey the stormwater runoff to a proposed stormwater basin located along the north side of the Tanager site. The stormwater basin will provide runoff volume storage and peak flow reduction. Site runoff will be directed to the basin by sheet flow, surface gutters or ditches, or collected in area drains/inlets and piped to the basin if surface conveyance is not possible. The proposed Tanager site will drain to the LECEF site through the four existing pipes between the two properties. See Figure 6 for the draft site layout.



Figure 6. Draft Tanager Site Layout

2.0 HYDROLOGIC CRITERIA & METHODOLOGY

The hydrology analysis utilizes criteria and methodology consistent with the County of Santa Clara Drainage Manual (Santa Clara County, 2007). Below is summary of the methodology based on the County manual.

2.1 DESIGN STORM FREQUENCY

- 10-year design storm (10 percent annual chance) conveyed in the storm drainage system (underground pipes and/or stable open channels)
- 100-year design storm (1-percent annual chance) safely conveyed away from the project site without creating or contributing to downstream or upstream flooding conditions.

2.2 CALCULATION METHODOLOGY

2.2.1 Modified Rational Method

For small drainage areas the Rational Method may be utilized to estimate peak discharges for site Projects with tributary areas less than or equal to 200 acres, where storage effects are not significant. However, for Very Small Drainage Areas (less than 50 acres), when detention basin computations are required, then the Modified Rational Method may be used. Table 2-1 below is an excerpt from the County Drainage Manual outlining the required methodology.

The Rational Method was originally developed to estimate peak discharges for sizing drainage structures, such as storm drains and culverts. The Modified Rational Method (MRM) is an extension of the Rational Method to produce simple runoff hydrographs. Application of the MRM produces a runoff hydrograph and runoff volume in contrast to application of the Rational Method, which produces only the peak design discharge. The hydrograph developed from application of the MRM is a special case of the unit hydrograph method. The Modified Rational Method first calculates the peak discharge using the same basic formula as the Rational Method given by:

$$Q = CiA$$

Where,

Q = peak runoff discharge (cubic feet per second, cfs)

C = runoff coefficient (reflective of hydrologic soil type and cover)

i = rainfall intensity (inches per hour) for a given time of concentration (Tc)

A = drainage area (acres)

Tc = Time of concentration (minutes)

For this project, we utilized the Modified Rational Method to calculate the peak flow rates and estimate runoff volumes for the existing and proposed Tanager site for the 10-year, and 100-year storm events. In addition, the unit hydrograph approach was also utilized to evaluate the runoff volume for a 1-inch rainfall, and the 10- and 100-year storm events.

Table 2-1. Summary of Santa Clara County Hydrologic Method Criteria

A. If projects require review, approval, or permit issuance by the Santa Clara Valley Water District, then the current hydrologic calculation methods approved by the District shall be used. Generally, these types of projects include: • Projects that outfall directly into a SCVWD facility; • Projects being constructed within 50 feet of a SCVWD facility; • Major projects which involve major flood protection or drainage facilities, or which may affect major flood protection or drainage facilities.							
B. If projects do not require SCVWD approval and they meet all of the following bulleted criteria, then the hydrologic method as noted is to be used: • No detention being used; • No substantial surface storage effects; • No large areas of pervious soils. <table> <tr> <th>Size of Drainage Area</th><th>Hydrologic Method to be Used</th></tr> <tr> <td>200 Acres or Less (Small Drainage Area)</td><td>Rational Method May Be Used</td></tr> <tr> <td>More Than 200 Acres (Large Drainage Area)</td><td>Unit Hydrograph Method Must Be Used</td></tr> </table>		Size of Drainage Area	Hydrologic Method to be Used	200 Acres or Less (Small Drainage Area)	Rational Method May Be Used	More Than 200 Acres (Large Drainage Area)	Unit Hydrograph Method Must Be Used
Size of Drainage Area	Hydrologic Method to be Used						
200 Acres or Less (Small Drainage Area)	Rational Method May Be Used						
More Than 200 Acres (Large Drainage Area)	Unit Hydrograph Method Must Be Used						
C. If projects do not require SCVWD approval and they meet any of the following bulleted criteria, then the hydrologic method as noted is to be used: • Detention being used • Substantial surface storage effects • Large areas of pervious soils <table> <tr> <th>Size of Drainage Area</th><th>Hydrologic Method to be Used</th></tr> <tr> <td>50 Acres or Less (Very Small Drainage Area)</td><td>Modified Rational Method <u>May Be Used</u> (APWA or ASCE Methods)*</td></tr> <tr> <td>More Than 50 Acres</td><td>Unit Hydrograph Method <u>Must Be Used</u></td></tr> </table>		Size of Drainage Area	Hydrologic Method to be Used	50 Acres or Less (Very Small Drainage Area)	Modified Rational Method <u>May Be Used</u> (APWA or ASCE Methods)*	More Than 50 Acres	Unit Hydrograph Method <u>Must Be Used</u>
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50 Acres or Less (Very Small Drainage Area)	Modified Rational Method <u>May Be Used</u> (APWA or ASCE Methods)*						
More Than 50 Acres	Unit Hydrograph Method <u>Must Be Used</u>						
*Refer to Chapter 6, Section 6.3.1							



2.2.1.1 Runoff Coefficient

The runoff coefficient is given by the following table from the County Drainage Manual. Note that HSG 'B' values were conservatively used for the onsite HSG 'A' values since no coefficients are provided for HSG 'A' soils.

Table 2-2 Runoff Coefficients for Rational Formula

Land Use	C for Soil Type		
	B	C	D
Low Density Residential	0.30	0.40	0.45
Medium Density Residential	0.50	0.55	0.60
High Density Residential	0.70	0.70	0.75
Commercial	0.80	0.80	0.80
Industrial	0.70	0.75	0.75
Parks	0.20	0.30	0.35
Agricultural	0.15	0.35	0.40
Urban Open Space	0.10	0.35	0.45
Shrub Land	0.10	0.20	0.30
Paved / Impervious Surface	0.85	0.85	0.85

2.2.1.2 Time of Concentration

The time of concentration is defined as the travel time of a drop of water from the most hydraulically remote point in the contributing area to the point where the discharge is being determined. The travel time for the water to move down the catchment can include overland flow time and the travel time in street gutters, roadside swales, storm drains, drainage channels, and other drainage ways. The hydrology analysis utilizes the time of concentration equations and approach set forth in the County Drainage Manual for natural and urbanized watersheds, where appropriate (existing or developed conditions).

2.2.1.3 Rainfall Intensity

Calculated times of concentration are used to establish the average rainfall intensity to be applied uniformly over the drainage area to produce its peak discharge for a specified return period using the Rational Formula. Santa Clara County utilizes specific regional equations to generate intensity-duration-frequency (IDF) relationship curves provided in the Drainage Manual. Refer to Section 3.5 of the County Drainage Manual for additional information.

2.2.2 Stormwater Basin and Runoff Volume Analysis

Note that the County has specific guidance for the design of retention/infiltration facilities which have no surface outflow but rely instead upon percolation to the groundwater and/or evaporation to the atmosphere to dispose of stored runoff. The County Drainage Manual, Section 6.2, indicates that retention facilities should only be used in areas where winter groundwater tables and percolation rates warrant their construction, and no other method of drainage is available. Retention/infiltration facilities require separate approval from the Santa Clara Valley Water District allowing percolation into the ground at the site proposed. For the purposes of this preliminary hydrology report, we have assumed that the proposed onsite basin will be lined (no infiltration) and function hydrologically as a retention/detention basin with no infiltration. Additional design discussion may be warranted regarding the nature and function of the proposed basin for the various storm events.

2.2.2.1 Hydrograph Method

Typically, the Rational/Modified Rational Method approach is used to determine design peak flow rates for inlets, pipes, swales, and other conveyance facilities within relatively small drainage areas. However, the Modified Rational Method is limited in its ability to reflect storm event runoff volumes when evaluating stormwater basins and storage facilities more accurately. Therefore, to supplement the Rational Method peak flow and APWA Modified Rational Method detention analysis, an SCS Curve number hydrograph approach was also utilized. The method follows the Santa Clara County Drainage Manual, Chapter 4 guidance.

The basic process of the hydrograph method includes:

- Simulating rainfall from a specified storm event
- Simulating rainfall losses due to interception and infiltration
- Simulating the overland flow into creeks, channels, or pipes to provide a runoff hydrograph at concentrated points
- Routing the hydrograph through creeks, channels, or pipes
- Routing the hydrograph through detention basins or reservoirs

Rainfall Pattern

The rainfall pattern (hyetograph) was obtained from the County Drainage Manual, and the 10-year, 24-hour, and 100-year, 24-hour rainfall depths per National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation data were utilized. The 10-year, 24-hour rainfall of 2.66 inches and a 100-year, 24-hour rainfall of 4.28 inches was utilized in the analysis.

Runoff Curve Numbers

Runoff curve numbers were obtained from the County Drainage Manual and composited for each sub-area and adjusted for the storm event antecedent moisture condition (AMC). An AMC II was calculated for the 10-year storm event using Drainage Manual Table E-1 and adjusted down for the 1-inch rain event (AMC I) and adjusted up for the 100-year storm event (AMC III) based on Table E-2. Values were evaluated and adjusted based on engineering judgement for individual sub-basins, as appropriate to more accurately reflect existing and proposed site conditions. Composite curve numbers were obtained using GIS mapping accounting for HSG soil type, land use, and cover conditions.

Runoff Volume Analysis

The HEC-HMS hydrologic modeling computer program developed by the U.S. Army Corps of Engineers was utilized for the hydrograph analysis for the existing and proposed site conditions for the 1-inch rainfall event, 10-year storm event, and 100-year storm event. The hydrographs were routed to determine ponding levels in the existing storage tank and the proposed detention basin and determine the maximum rainfall the storage tank system can accommodate prior to discharging. The proposed Tanager stormwater basin stage-storage-outflow curve was estimated based on the preliminary site plan and assumptions on operating conditions to retain the 1-inch storm within the proposed Tanager basin and provide detention (peak flow reduction) for the proposed 10-year and 100-year peak flow rates from the proposed Tanager site development. The HEC-HMS model setup follows the sample in the County Drainage Manual.

3.0 RESULTS AND DISCUSSION

The following sections present the results of the Rational Method, APWA Modified Rational Method detention analysis, and the HEC-HMS hydrograph method approach.

3.1 RATIONAL METHOD

The Rational Method peak flow rates can be utilized for sizing onsite pipes, inlets, and swales. Assumptions were made regarding the proposed Tanager site grading to complete this draft hydrology study. The proposed site was subdivided into four main drainage areas along with the stormwater basin and adjacent area berm area between the Tanager and LECEF sites. Once the grading has been confirmed, the proposed condition on-site rational method drainage basins and calculations can be updated to reflect proposed grades and any inlets/piping/ditches to the proposed stormwater basin.

3.2 APWA MODIFIED RATIONAL METHOD DETENTION ANALYSIS

The APWA Modified Rational Method detention analysis was utilized to provide an estimate of proposed runoff volumes and as a point of comparison and validation of the HEC-HMS hydrograph method results. The results of this method are provided for comparative purposes in the Appendix B.

3.3 HEC-HMS HYDROGRAPH ANALYSIS

The HEC-HMS hydrograph analysis was utilized to compare the existing and proposed conditions runoff volumes, to determine if the proposed preliminary stormwater basin has sufficient capacity and to determine the function of the LECEF site stormwater facilities with the proposed Tanager site in place.

3.4 RESULTS AND COMPARISON

Table 3-1 presents the summary output of the Rational Method peak flow and HEC-HMS Hydrograph Method results and compares the existing condition to the proposed conditions. Based on the results, the existing stormwater storage tank on the LECEF should have sufficient capacity (within the working capacity) to accommodate the proposed Tanager site, assuming the proposed Tanager stormwater basin is constructed per the preliminary layout. Under proposed conditions, it is recommended that the Tanager basin be designed to retain the runoff from the 1-inch rainfall onsite, and to install gates or riser pipes on the existing site outlet pipes to provide detention for larger storm events in order to limit the post-development peak flow downstream to values close to existing conditions.

Based on an analysis of the operation of the existing LECEF storage tank under proposed conditions (with the proposed Tanager stormwater basin), the storage tank can accommodate the proposed condition 1-inch rain event and up to a 1.2-inch rainfall event prior to discharging.

3.5 RECOMMENDATIONS

Following are recommended next steps for the proposed site stormwater design and to update this preliminary draft report:

1. Coordinate with site designers on proposed Tanager stormwater basin design and function for the 1-inch rain event and higher design storm events (recommend retaining the 1-inch proposed Tanager site runoff, and detain the higher storm events with gates, valves, or riser pipes). The basin design should also consider an emergency spillway and overflow path.
2. Coordinate regarding grading and structure impacts to the LECEF stormwater facilities.
 - a. Existing south swale and inlet/pipe outlet on the west side will be impacted
 - b. Existing east swale will be impacted
3. Confirm LECEF pump station and storage tank operating conditions for proposed conditions and update the HEC-HMS storage-outflow curve for the pump station.
4. Update proposed Tanager site hydrology based on proposed grades and runoff collection and conveyance facilities, and discussion items above.

Table 3-1. Tanager and LECEF Hydrology Summary

1-inch Storm Event

HEC-HMS SUMMARY

Location	Cummulative Area (acres)	Existing 1-inch Storm Peak Flow (cfs)	Existing 1-inch Storm Runoff Volume (ac-ft)	Proposed 1-inch Storm Peak Flow (cfs)	Proposed 1-inch Storm Runoff Volume (ac-ft)
Tanager Site	13.23	0.3	0.1	6.7	1.0
LECEF South Site	11.90	5.7	0.9	5.7	0.9
LECEF South Swale	25.13	6.2	1	6	0.9
LECEF East Site	8.40	3.8	0.6	3.8	0.6
LECEF East Swale	33.53	10.1	1.6	9.8	1.5
LECEF Pump Station	33.53	10.2	1.6	9.9	1.5
LECEF Storage Tank	33.53	0	0	0	0

Proposed 1-inch Storm Runoff Vol (cu-ft)	Proposed 1-inch Storm Runoff Vol (gallons)
43,560	325,851
39,204	293,266
39,204	293,266
26,136	195,511
65,340	488,777
65,340	488,777

Notes:

- 1) 1-inch Existing and Proposed condition storm event runoff can be accommodated in onsite stormwater storage tank without discharging. The total runoff volume produced from 1-inch storm event is 1.5 ac-ft in proposed condition.
- 2) The working capacity of the tank is approximately 2.0 acre-feet (653,184 gallons)
- 3) At the working capacity of about 2.0 ac-ft, the storage tank can accommodate a 1.2-inch rainfall event, before discharging.

10-year Storm Event

HEC-HMS SUMMARY

Location	Cummulative Area (acres)	Existing 10-yr Storm Peak Flow (cfs)	Existing 10-yr Storm Runoff Volume (ac-ft)	Proposed 10-yr Storm Peak Flow (cfs)	Proposed 10-yr Storm Runoff Volume (ac-ft)
Tanager Site	13.23	2.8	0.8	18.9	2.9
Tanager Basin	13.23	n/a	n/a	2.5	1.8
LECEF South Site	11.90	16.5	2.5	16.5	2.5
LECEF South Swale	25.13	19.1	3.3	17.2	4.3
LECEF East Site	8.40	11.2	1.7	11.2	1.7
LECEF East Swale	33.53	29.2	5.0	27.4	6.0
LECEF Pump Station	33.53	29.1	5.0	27.4	6.0
LECEF Storage Tank	33.53	-	-	-	-

Rational Method Existing RM Peak Flow (cfs)	Undetained Proposed RM Peak Flow (cfs)
2.47	19.9
n/a	19.9
17.7	17.7
20.2	37.6
12.5	12.5
32.7	50.1
32.7	50.1

Note: 10-year storm event would surcharge the existing LECEF storage tank. Excess runoff would need to be discharged, after the tank reached its working capacity. 4.0 acre-feet of runoff volume would require discharge.

100-year Storm Event

HEC-HMS SUMMARY

Location	Cummulative Area (acres)	Existing 100-yr Storm Peak Flow (cfs)	Existing 100-yr Storm Runoff Volume (ac-ft)	Proposed 100-yr Storm Peak Flow (cfs)	Proposed 100-yr Storm Runoff Volume (ac-ft)
Tanager Site	13.23	11.1	2.5	31.2	4.7
Tanager Basin	13.23	n/a	n/a	11.1	3.6
LECEF South Site	11.90	27.7	4.2	27.7	4.2
LECEF South Swale	25.13	27.3	6.8	23.7	7.7
LECEF East Site	8.40	19.4	2.9	19.4	2.9
LECEF East Swale	33.53	36.5	9.7	35.2	10.6
LECEF Pump Station	33.53	37.1	9.7	35.2	10.6
LECEF Storage Tank	33.53	-	-	-	-

Rational Method Existing RM Peak Flow (cfs)	Undetained Proposed RM Peak Flow (cfs)
3.7	27
n/a	27
24.1	24.1
20.2	51
17	17
32.7	68
32.7	68

Note: 100-year storm event would surcharge the existing LECEF storage tank. Excess runoff would need to be discharged, after the tank had reached its working capacity. 4.2 acre-feet of runoff volume would require discharge.

APPENDIX A
HYDROLOGY DATA AND OUTPUT

CALPINE - TANAGER ENERGY STORAGE FACILITY - RATIONAL METHOD - INDIVIDUAL SUBAREA CALCULATIONS

EXISTING CONDITIONS - 10-yr

Subarea	Initial Subarea Tc	Overland Flow Length	Effective Slope	Overland Flow Time (Kirpich)	Gutter Flow Length	Average Gutter Slope	Gutter Velocity	Gutter Flow Time	Swale Flow Length	Average Swale Slope	Swale Velocity	Swale Flow Time	Total Subarea Tc	Tc used for Peak Q calc	D	A	B	MAP	x	i	C	Area	Σ Product Area * Coefficient	Q (SUB)	Q (acumm)
	(min)	(ft)	(ft/ft)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(min)	(min)	(hr)					(in/hr)		(ac)		(cfs)	(cfs)
EX-T1A		1247	0.0050	24.51									24.5	25.0	0.417	0.34351	0.006823	14.5	0.442439	1.061853	0.22	6.29	1.379	1.46	1.46
EX-T2		420	0.0100	14.81									14.8	15.0	0.250	0.294808	0.00471	14.5	0.363103	1.452412	0.1	2.00	0.200	0.29	1.75
EX-T3		438	0.0080	15.41									15.4	15.0	0.250	0.294808	0.00471	14.5	0.363103	1.452412	0.1	2.30	0.230	0.33	2.09
EX-T4		493	0.0080	15.93									15.9	15.0	0.250	0.294808	0.00471	14.5	0.363103	1.452412	0.1	2.64	0.264	0.38	2.47
Subtotal																						13.23			
EX-LE1	5				472	0.005	2.75	2.86	693	0.0020	4.00	2.89	10.7	10.0	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.8	11.90	9.520	17.73	20.20
EX-LE2	5				266	0.008	2.75	1.61	522	0.0040	4.00	2.18	8.8	10.0	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.8	8.40	6.720	12.52	32.72
Subtotal																						20.30		30.25	
TOTAL																						33.53			

Rational Method Notes:

1. Existing conditions for the Tanager site is an undeveloped field with perennial grass (fair to good cover). Kirpich Formula (equation 3-2 per County Drainage Manual) is used for the undeveloped parcel
2. For existing LECEf site and propsoed Tanager site, "urbanized" conditions are used with an initial overland flow Tc of 5 minutes followed by gutter and swale flow times to the point of concentration.
3. Gutter flow time uses a street flow nomograph based on street slope, gutter 'n' of 0.015, and curb height of 6 inches. Velocity is estimated based on full curb height flow (conservative)
4. Swale velocity assumed at 4 fps (conservative value for time of concentration calculations).
5. Tanager site area taken as full parcel area of approximately square feet or 576,320 sf = 13.23 ac
6. Rational Method Runoff coefficient based Drainage Manual Table 3-1.

HEC-HMS (SCS Curve Number Method) Notes:

7. Curve Number from Table E-1 (for HMS analysis) uses CN=35 (pervious) and CN=98 (impervious) for combined CN = 91.7 for 90% impervious proposed Tanager site at AMC II
91.1 for 85% impervious existing LECEf Basin 1 at AMC II
85.4 for 80% impervious existing LECEf Basin 2 at AMC II
8. Maximum Commercial/Industrial (80% Impervious) per Table E-1 with HSG 'D' = 79 (AMC II), 62 (AMC I), 91 (AMC III)

- Values calculated under Note 8 are slightly more conservative and were used in the HEC-HMS Analysis

3.4.1 3.4.1 Natural Watersheds

For natural watersheds with flow primarily in channels after an initial overland flow distance typically equal to about 300 feet, the Kirpich formula may be used:

$$t_e = 0.0078 \left(\frac{L^2}{S} \right)^{0.385} + 10 \quad (3-2)$$

Where: t_e = time of concentration (minutes)
 L = maximum length of travel from headwater to outlet (feet)
 S = effective slope along L (feet per foot)

3.4.2 Urbanized Drainage Basins

Runoff from urbanized basins travels in three phases:

1. Initial overland flow represents rainfall collecting on roof tops and making its way to an impervious surface, where runoff begins in earnest. This value is assumed to be ten minutes where a substantial area is drained, and five minutes when only street or parking lot sections are drained.
2. Gutter flow represents the sheet flow of runoff over pavement, other impervious surfaces (e.g. street gutters), or pervious surfaces toward an initial collection point in the storm drain system. Calculations for this portion of the initial travel time shall be based upon nomographs included as Figure A-1 in Appendix A.
3. Pipe flow in a storm drain collection system shall be calculated by dividing the distance between design points by the average flow velocity in the subject reach of pipe. (More detailed procedures regarding storm drain hydraulics are provided in Chapter 5 of this manual.) Since flow velocities may change between inlets or manholes due to changes in flow rate, pipe size, roughness, or slope, the total pipe flow time must be calculated as the sum of the time increments for each section of storm drain.

The total time of concentration to be used in the Rational Method calculation is the sum of the overland flow time plus any travel time in pipes, gutters, swales, or channels leading down to the point where the discharge is being determined.

Interpolation for Parameter 'A'										Interpolation for Parameter 'B'									
	5	0.201876									5	0.002063							
7			5	0.056806	0.011361		0.224598			7			5	0.001506	0.000301	0.0026654			
	10	0.258682									10	0.003569							
10.3			5	0.036126	0.007225		0.26085			10.3			5	0.001141	0.000228	0.00363746			
	15	0.294808									15	0.00471							
25			15	0.073053	0.00487		0.34351			25			15	0.003169	0.000211	0.00682267			
	30	0.367861									30	0.007879							
45			30	0.059862	0.001995		0.397792			45			30	0.006923	0.000231	0.0113405			
	60	0.427723									60	0.014802							

Twenty-four-hour storm durations are used to establish rainfall intensity-duration-frequency (IDF) curves provided in Appendix B. The TDS Regional Equation is given by:

$$x_{r,D} = A_{r,D} + (B_{r,D} MAP) \quad (3-3)$$

Where: $x_{r,D}$ = precipitation depth for a specific return period and storm duration (inches)
 T = return period (years)
 D = storm duration (hours)
 $A_{r,D}, B_{r,D}$ = coefficients from Tables B-1 and -2 (dimensionless)
 MAP = Mean Annual Precipitation (inches)

The precipitation intensity, i , is given by:

$$i_{r,D} = \frac{x_{r,D}}{D} \quad (3-4)$$

Intensity-Duration-Frequency (IDF) curves for Mean Annual Precipitation (MAP) values of 15-, 20-, 25-, 30-, 35-, and 40-inches are provided for users' convenience in Appendix B. Intensity curves for 2-, 5-, 10-, 25-, 50-, and 100-year return periods are shown for each of the IDF curves. Interpolation may be used to obtain IDF relationships for MAP values between those shown in Appendix B, or Equations 3-3 and 3-4 can be applied directly.

10-YR RETURN PERIOD		
5-min	0.201876	0.002063
10-min	0.258682	0.003569
15-min	0.294808	0.004710
30-min	0.367861	0.007879
1-hr	0.427723	0.014802
2-hr	0.522608	0.027457
3-hr	0.591660	0.038944
6-hr	0.625054	0.070715
12-hr	0.641638	0.111660
24-hr	0.567017	0.162590
48-hr	0.832445	0.221820
72-hr	0.810509	0.265469

CALPINE - TANAGER ENERGY STORAGE FACILITY - RATIONAL METHOD - INDIVIDUAL SUBAREA CALCULATIONS

EXISTING CONDITIONS - 100-yr

Subarea	Initial Subarea Tc	Overland Flow Length	Effective Slope	Overland Flow Time (Kirpich)	Gutter Flow Length	Average Gutter Slope	Gutter Velocity	Gutter Flow Time	Swale Flow Length	Average Swale Slope	Swale Velocity	Swale Flow Time	Total Subarea Tc	Tc used for Peak Q calc	D	A	B	MAP	x	Rainfall Intensity, i	Runoff Coefficient, C	Area	Σ Product Area * Coefficient	Q (SUB)	Q (accum)
	(min)	(ft)	(ft/ft)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(min)	(min)	(hr)					(in/hr)		(ac)		(cfs)	(cfs)
EX-T1A		1247	0.0050	24.51									24.5	25.0	0.417	0.509743	0.009557	14.5	0.648319	1.555966	0.23	6.29	1.427	2.22	2.22
EX-T2		420	0.0100	14.81									14.8	15.0	0.250	0.42136	0.006957	14.5	0.522237	2.088946	0.1	2.00	0.200	0.42	2.64
EX-T3		438	0.0080	15.41									15.4	15.0	0.250	0.42136	0.006957	14.5	0.522237	2.088946	0.1	2.30	0.230	0.48	3.12
EX-T4		493	0.0080	15.93									15.9	15.0	0.250	0.42136	0.006957	14.5	0.522237	2.088946	0.1	2.64	0.264	0.55	3.67
Subtotal																						13.23			
EX-LE1	5				472	0.005	2.75	2.86	693	0.0020	4.00	2.89	10.7	10.0	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.8	11.90	9.520	24.06	27.73
EX-LE2	5				266	0.008	2.75	1.61	522	0.0040	4.00	2.18	8.8	10.0	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.8	8.40	6.720	16.99	44.72
Subtotal																						20.30		41.05	
TOTAL																						33.53			

Rational Method Notes:

- Existing conditions for the Tanager site is an undeveloped field with perennial grass (fair to good cover). Kirpich Formula (equation 3-2 per County Drainage Manual) is used for the undeveloped parcel
- For existing LECE site and proposed Tanager site, "urbanized" conditions are used with an initial overland flow Tc of 5 minutes followed by gutter and swale flow times to the point of concentration.
- Gutter flow time uses a street flow nomograph based on street slope, gutter 'n' of 0.015, and curb height of 6 inches. Velocity is estimated based on full curb height flow (conservative)
- Swale velocity assumed at 4 fps (conservative value for time of concentration calculations).
- Tanager site area taken as full parcel area of approximately 576,320 sf = 13.23 ac
- Rational Method Runoff coefficient based Drainage Manual Table 3-1.

HEC-HMS (SCS Curve Number Method) Notes:

- Curve Number from Table E-1 (for HMS analysis) uses CN=35 (pervious) and CN=98 (impervious) for combined CN =
91.7 for 90% impervious proposed Tanager site at AMC II
91.1 for 85% impervious existing LECEFC Basin 1 at AMC II
85.4 for 80% impervious existing LECEFC Basin 2 at AMC II
Use CN= 81 1" Rain AMC I
Use CN= 80 1" Rain AMC I
Use CN= 71 1" Rain AMC I

- Maximum Commercial/Industrial (80% Impervious) per Table E-1 with HSG 'D' = 79 (AMC II), 62 (AMC I), 91 (AMC III)

- Values calculated under Note 8 are slightly more conservative and were used in the HEC-HMS Analysis

3.4.1 3.4.1 Natural Watersheds

For natural watersheds with flow primarily in channels after an initial overland flow distance typically equal to about 300 feet, the Kirpich formula may be used:

$$t_e = 0.0078 \left(\frac{L^2}{S} \right)^{0.385} + 10 \quad (3-2)$$

Where: t_e = time of concentration (minutes)
 L = maximum length of travel from headwater to outlet (feet)
 S = effective slope along L (feet per foot)

3.4.2 Urbanized Drainage Basins

Runoff from urbanized basins travels in three phases:

- Initial overland flow represents rainfall collecting on roof tops and making its way to an impervious surface, where runoff begins in earnest. This value is assumed to be ten minutes where a substantial area is drained, and five minutes when only street or parking lot sections are drained.
- Gutter flow represents the sheet flow of runoff over pavement, other impervious surfaces (e.g. street gutters), or pervious surfaces toward an initial collection point in the storm drain system. Calculations for this portion of the initial travel time shall be based upon nomographs included as Figure A-1 in Appendix A.
- Pipe flow in a storm drain collection system shall be calculated by dividing the distance between design points by the average flow velocity in the subject reach of pipe. (More detailed procedures regarding storm drain hydraulics are provided in Chapter 5 of this manual.) Since flow velocities may change between inlets or manholes due to changes in flow rate, pipe size, roughness, or slope, the total pipe flow time must be calculated as the sum of the time increments for each section of storm drain.

The total time of concentration to be used in the Rational Method calculation is the sum of the overland flow time plus any travel time in pipes, gutters, swales, or channels leading down to the point where the discharge is being determined.

Interpolation for Parameter 'A'							Interpolation for Parameter 'B'						
	5	0.269993						5	0.00358				
7			5	0.04527	0.009054	0.288101	7			5	0.003732	0.000746	0.0050728
	10	0.315263						10	0.007312				
11.4			5	0.106097	0.021219	0.34497	11.4			5	-0.000355	-7.1E-05	0.0072126
	15	0.42136						15	0.006957				
25			15	0.132574	0.008838	0.509743	25			15	0.0029	0.000193	0.00889033
	30	0.553934						30	0.009857				
45			30	0.072674	0.002422	0.590271	45			30	0.009344	0.000311	0.014529
	60	0.626608						60	0.019201				

Twenty-four-hour storm durations are used to establish rainfall intensity-duration-frequency (IDF) curves provided in Appendix B. The TDS Regional Equation is given by:

$$x_{T,D} = A_{T,D} + (B_{T,D} MAP) \quad (3-3)$$

Where: $x_{T,D}$ = precipitation depth for a specific return period and storm duration (inches)

T = return period (years)
 D = storm duration (hours)
 $A_{T,D}, B_{T,D}$ = coefficients from Tables B-1 and -2 (dimensionless)
 MAP = Mean Annual Precipitation (inches)

The precipitation intensity, i , is given by:

$$i_{T,D} = \frac{x_{T,D}}{D} \quad (3-4)$$

Intensity-Duration-Frequency (IDF) curves for Mean Annual Precipitation (MAP) values of 15-, 20-, 25-, 30-, 35-, and 40-inches are provided for users' convenience in Appendix B. Intensity curves for 2-, 5-, 10-, 25-, 50-, and 100-year return periods are shown for each of the IDF curves. Interpolation may be used to obtain IDF relationships for MAP values between those shown in Appendix B, or Equations 3-3 and 3-4 can be applied directly.

100-YR RETURN PERIOD		
5-min	0.269993	0.003580
10-min	0.315263	0.007312
15-min	0.421360	0.006957
30-min	0.553934	0.009857
1-hr	0.626608	0.019201
2-hr	0.732944	0.036193
3-hr	0.816471	0.051981
6-hr	0.776677	0.101053
12-hr	0.821859	0.162184
24-hr	0.814046	0.243391
48-hr	1.210895	0.325943
72-hr	1.175000	0.389038

CALPINE - TANAGER ENERGY STORAGE FACILITY - YEAR RATIONAL METHOD - INDIVIDUAL SUBAREA CALCULATIONS

PROPOSED CONDITIONS - 10-yr

Subarea	Initial Subarea Tc	Gutter Flow Length	Average Gutter Slope	Gutter Velocity	Gutter Flow Time	Swale Flow Length	Average Swale Slope	Swale Velocity	Swale Flow Time	Total Subarea Tc	Tc used for peak Q calc	D	A	B	MAP	x	i	C	Area	Σ Product Area * Coefficient	Q (SUB)	Q (acumm)
	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(min)	(min)	(hr)					(in/hr)		(ac)		(cfs)	(cfs)
PR-T1	5	590	0.005	1.8	5.46					10.5	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.85	2.75	2.338	4.35	4.35
PR-T2	5	565	0.005	1.8	5.23					10.2	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.85	2.85	2.423	4.51	8.87
PR-T3	5	645	0.005	1.8	5.97					11.0	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.85	2.75	2.338	4.35	13.22
PR-T4	5	615	0.005	1.8	5.69					10.7	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.85	2.75	2.338	4.35	17.57
PR-T5	10	0	0							10.0	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.15	0.83	0.125	0.23	17.81
PR-T6	10	0	0							10.0	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.85	1.30	1.105	2.06	19.86
Subtotal																			13.23			
EX-LE1	5	472	0.005	2.75	2.86	693	0.0020	4.00	2.89	10.7	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.8	11.90	9.520	17.73	37.60
EX-LE2	5	266	0.008	2.75	1.61	522	0.0040	4.00	2.18	8.8	10	0.167	0.258682	0.003569	14.5	0.310433	1.862595	0.8	8.40	6.720	12.52	50.11
Subtotal																			20.30		30.25	
TOTAL																			33.53			

Rational Method Notes:

1. Existing conditions for the Tanager site is an undeveloped field with perennial grass (fair to good cover). Kirpich Formula (equation 3-2 per County Drainage Manual) is used for the undeveloped parcel
2. For existing LECF site and proposed Tanager site, "urbanized" conditions are used with an initial overland flow Tc of 5 minutes followed by gutter and swale flow times to the point of concentration.
3. Gutter flow time uses a street flow nomograph based on street slope, gutter 'n' of 0.015, and curb height of 6 inches. Velocity is estimated based on full curb height flow (conservative)
4. Swale velocity assumed at 4 fps (conservative value for time of concentration calculations).
5. Tanager site area taken as full parcel area of 576,320 sf = 13.23 ac
6. Rational Method Runoff coefficient based Drainage Manual Table 3-1.

HEC-HMS (SCS Curve Number Method) Notes:

7. Curve Number from Table E-1 (for HMS analysis) uses CN=35 (pervious) and CN=98 (impervious)
- 91.7 for 90% impervious proposed Tanager site at AMC II Use CN= 81 1" Rain AMC I
- 91.1 for 85% impervious existing LECF Basin 1 at AMC II Use CN= 80 1" Rain AMC I
- 85.4 for 80% impervious existing LECF Basin 2 at AMC II Use CN= 71 1" Rain AMC I
8. Maximum Commercial/Industrial (80% Impervious) per Table E-1 with HSG 'D' = 79 (AMC II), 62 (AMC I), 91 (AMC III)
- Values calculated under Note 8 are slightly more conservative and were used in the HEC-HMS Analysis

3.4.1	3.4.1	Natural Watersheds	Interpolation for Parameter 'A'	Interpolation for Parameter 'B'
			5 0.201876	5 0.002063
		For natural watersheds with flow primarily in channels after an initial overland flow distance typically equal to about 300 feet, the Kirpich formula may be used:	9.6 0.056806 0.011361 0.254138	9.6 0.001506 0.000301 0.00344852
		$t_p = 0.0078 \left(\frac{L^2}{S} \right)^{0.385} + 10 \quad (3-2)$	10 0.258682	10 0.003569
		Where: t_p = time of concentration (minutes)	10.3 0.036126 0.007225 0.26085	10.3 0.001141 0.000228 0.00363746
		L = maximum length of travel from headwater to outlet (feet)	15 0.294808	15 0.00471
		S = effective slope along L (feet per foot)	20 0.367861	15 0.003169 0.000211 0.00494239
			30 0.059862 0.001995 0.397792	30 0.006923 0.000231 0.0113405
			45 0.427723	60 0.014802

3.4.2 Urbanized Drainage Basins

Runoff from urbanized basins travels in three phases:

1. Initial overland flow represents rainfall collecting on roof tops and making its way to an impervious surface, where runoff begins in earnest. This value is assumed to be ten minutes where a substantial area is drained, and five minutes when only street or parking lot sections are drained.
2. Gutter flow represents the sheet flow of runoff over pavement, other impervious surfaces (e.g. street gutters), or pervious surfaces toward an initial collection point in the storm drain system. Calculations for this portion of the initial travel time shall be based upon nomographs included as Figure A-1 in Appendix A.
3. Pipe flow in a storm drain collection system shall be calculated by dividing the distance between design points by the average flow velocity in the subject reach of pipe. (More detailed procedures regarding storm drain hydraulics are provided in Chapter 5 of this manual.) Since flow velocities may change between inlets or manholes due to changes in flow rate, pipe size, roughness, or slope, the total pipe flow time must be calculated as the sum of the time increments for each section of storm drain.

The total time of concentration to be used in the Rational Method calculation is the sum of the overland flow time plus any travel time in pipes, gutters, swales, or channels leading down to the point where the discharge is being determined.

Twenty-four-hour storm durations are used to establish rainfall intensity-duration-frequency (IDF) curves provided in Appendix B. The TD5 Regional Equation is given by:

$$x_{r,D} = A_{r,D} + (B_{r,D} MAP) \quad (3-3)$$

Where: $x_{r,D}$ = precipitation depth for a specific return period and storm duration (inches)

T = return period (years)

D = storm duration (hours)

$A_{r,D}, B_{r,D}$ = coefficients from Tables B-1 and -2 (dimensionless)

MAP = Mean Annual Precipitation (inches)

The precipitation intensity, $i_{r,D}$ is given by:

$$i_{r,D} = \frac{x_{r,D}}{D} \quad (3-4)$$

Intensity-Duration-Frequency (IDF) curves for Mean Annual Precipitation (MAP) values of 15, 20, 25, 30, 35, and 40-inches are provided for users' convenience in Appendix B. Intensity curves for 2, 5, 10, 25, 50, and 100-year return periods are shown for each of the IDF curves. Interpolation may be used to obtain IDF relationships for MAP values between those shown in Appendix B, or Equations 3-3 and 3-4 can be applied directly.

10-YR RETURN PERIOD		
5-min	0.201876	0.002063
10-min	0.258682	0.003569
15-min	0.294808	0.004710
30-min	0.367861	0.007879
1-hr	0.427723	0.014802
2-hr	0.522608	0.027457
3-hr	0.591660	0.038944
6-hr	0.625054	0.070715
12-hr	0.641638	0.111660
24-hr	0.567017	0.162550
48-hr	0.832445	0.221820
72-hr	0.810509	0.265469

CALPINE - TANAGER ENERGY STORAGE FACILITY - 10-YEAR RATIONAL METHOD - INDIVIDUAL SUBAREA Q10 CALCULATIONS

PROPOSED CONDITIONS - 10-yr

APWA METHOD DETENTION ANALYSIS

Setting maximum peak outflow = existing conditions peak flow

											Release Rate = 2.5 cfs	
Time (min)	D (hr)	A	B	MAP	x, 10-yr Depth (in)	Intensity (in/hr)	Avg Runoff Coefficient	Area (ac)	Q (cfs)	Runoff Volume (cu-ft)	Release Flow Volume (cu-ft)	Required Storage Volume (cu-ft)
10	0.17	0.258682	0.003569	14.5	0.3104325	1.862595	0.806	13.23	19.86	11918	1500	10418
15	0.25	0.294808	0.00471	14.5	0.363103	1.452412	0.806	13.23	15.49	13940	2250	11690
20	0.33	0.319159	0.005766333	14.5	0.402770833	1.208313	0.806	13.23	12.89	15463	3000	12463
25	0.42	0.34351	0.006822667	14.5	0.442438667	1.061853	0.806	13.23	11.32	16986	3750	13236
30	0.50	0.367861	0.007879	14.5	0.4821065	0.964213	0.806	13.23	10.28	18509	4500	14009
35	0.58	0.377838	0.009032833	14.5	0.508814083	0.872253	0.806	13.23	9.30	19534	5250	14284
40	0.67	0.387815	0.010186667	14.5	0.535521667	0.803283	0.806	13.23	8.57	20560	6000	14560
45	0.75	0.397792	0.0113405	14.5	0.56222925	0.749639	0.806	13.23	7.99	21585	6750	14835
50	0.83	0.407769	0.012494333	14.5	0.588936833	0.706724	0.806	13.23	7.54	22611	7500	15111
55	0.92	0.417746	0.013648167	14.5	0.615644417	0.671612	0.806	13.23	7.16	23636	8250	15386
60	1	0.427723	0.014802	14.5	0.642352	0.642352	0.806	13.23	6.85	24661	9000	15661
120	2	0.522608	0.027457	14.5	0.9207345	0.460367	0.806	13.23	4.91	35349	18000	17349
170	2.833333	0.58015133	0.0370295	14.5	1.117079083	0.394263	0.806	13.23	4.20	42887	25500	17387
180	3	0.59166	0.038944	14.5	1.156348	0.385449	0.806	13.23	4.11	44395	27000	17395
190	3.166667	0.59351522	0.040709056	14.5	1.183796528	0.37383	0.806	13.23	3.99	45449	28500	16949
360	6	0.625054	0.070715	14.5	1.6504215	0.27507	0.806	13.23	2.93	63363	54000	9363
720	12	0.641638	0.11166	14.5	2.260708	0.188392	0.806	13.23	2.01	86794	108000	-21206
1440	24	0.567017	0.16255	14.5	2.923992	0.121833	0.806	13.23	1.30	112258	216000	-103742

Interpolation for Parameter 'A'

	5	0.201876					
9.6			5	0.056806	0.0113612	0.25413752	
	10	0.258682					
10.3			5	0.036126	0.0072252	0.26084956	
	15	0.294808					
25			15	0.073053	0.0048702	0.34351	
	30	0.367861					
45			30	0.059862	0.0019954	0.397792	
	60	0.427723					
100			60	0.094885	0.001581417	0.49097967	
	120	0.522608					
170			60	0.069052	0.001150867	0.58015133	
	180	0.59166					
190			180	0.033394	0.000185522	0.59351522	
	360	0.625054					
400			360	0.016584	4.60667E-05	0.62689667	
	720	0.641638					
1000			720	-0.07462	-0.00010364	0.61261872	
	1440	0.567017					

Interpolation for Parameter 'B'

	5	0.002063					
9.6			5	0.001506	0.000301	0.003449	
	10	0.003569					
10.3			5	0.001141	0.000228	0.003637	
	15	0.00471					
25			15	0.003169	0.000211	0.006823	
	30	0.007879					
45			30	0.006923	0.000231	0.011341	
	60	0.014802					
100			60	0.012655	0.000211	0.023239	
	120	0.027457					
170			60	0.011487	0.000191	0.03703	
	180	0.038944					
190			180	0.031771	0.000177	0.040709	
	360	0.070715					
400			360	0.040945	0.000114	0.075264	
	720	0.11166					
1000			720	0.05089	7.07E-05	0.131451	
	1440	0.16255					

CALPINE - TANAGER ENERGY STORAGE FACILITY - RATIONAL METHOD - INDIVIDUAL SUBAREA CALCULATIONS

EXISTING CONDITIONS - 100-yr

Subarea	Initial Subarea Tc	Overland Flow Length	Effective Slope	Overland Flow Time (Kirpich)	Gutter Flow Length	Average Gutter Slope	Gutter Velocity	Gutter Flow Time	Swale Flow Length	Average Swale Slope	Swale Velocity	Swale Flow Time	Total Subarea Tc	Tc used for Peak Q calc	D	A	B	MAP	x	Rainfall Intensity, i	Runoff Coefficient, C	Area	Σ Product Area * Coefficient	Q (SUB)	Q (accum)
	(min)	(ft)	(ft/ft)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(min)	(min)	(hr)					(in/hr)		(ac)		(cfs)	(cfs)
EX-T1A		1247	0.0050	24.51									24.5	25.0	0.417	0.509743	0.009557	14.5	0.648319	1.555966	0.23	6.29	1.427	2.22	2.22
EX-T2		420	0.0100	14.81									14.8	15.0	0.250	0.42136	0.006957	14.5	0.522237	2.088946	0.1	2.00	0.200	0.42	2.64
EX-T3		438	0.0080	15.41									15.4	15.0	0.250	0.42136	0.006957	14.5	0.522237	2.088946	0.1	2.30	0.230	0.48	3.12
EX-T4		493	0.0080	15.93									15.9	15.0	0.250	0.42136	0.006957	14.5	0.522237	2.088946	0.1	2.64	0.264	0.55	3.67
Subtotal																						13.23			
EX-LE1	5				472	0.005	2.75	2.86	693	0.0020	4.00	2.89	10.7	10.0	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.8	11.90	9.520	24.06	27.73
EX-LE2	5				266	0.008	2.75	1.61	522	0.0040	4.00	2.18	8.8	10.0	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.8	8.40	6.720	16.99	44.72
Subtotal																						20.30		41.05	
TOTAL																						33.53			

Rational Method Notes:

- Existing conditions for the Tanager site is an undeveloped field with perennial grass (fair to good cover). Kirpich Formula (equation 3-2 per County Drainage Manual) is used for the undeveloped parcel
- For existing LECE site and proposed Tanager site, "urbanized" conditions are used with an initial overland flow Tc of 5 minutes followed by gutter and swale flow times to the point of concentration.
- Gutter flow time uses a street flow nomograph based on street slope, gutter 'n' of 0.015, and curb height of 6 inches. Velocity is estimated based on full curb height flow (conservative)
- Swale velocity assumed at 4 fps (conservative value for time of concentration calculations).
- Tanager site area taken as full parcel area of approximately 576,320 sf = 13.23 ac
- Rational Method Runoff coefficient based Drainage Manual Table 3-1.

HEC-HMS (SCS Curve Number Method) Notes:

- Curve Number from Table E-1 (for HMS analysis) uses CN=35 (pervious) and CN=98 (impervious) for combined CN =
91.7 for 90% impervious proposed Tanager site at AMC II
91.1 for 85% impervious existing LECEFC Basin 1 at AMC II
85.4 for 80% impervious existing LECEFC Basin 2 at AMC II
Use CN= 81 1" Rain AMC I
Use CN= 80 1" Rain AMC I
Use CN= 71 1" Rain AMC I

- Maximum Commercial/Industrial (80% Impervious) per Table E-1 with HSG 'D' = 79 (AMC II), 62 (AMC I), 91 (AMC III)

- Values calculated under Note 8 are slightly more conservative and were used in the HEC-HMS Analysis

3.4.1 3.4.1 Natural Watersheds

For natural watersheds with flow primarily in channels after an initial overland flow distance typically equal to about 300 feet, the Kirpich formula may be used:

$$t_c = 0.0078 \left(\frac{L^2}{S} \right)^{0.385} + 10 \quad (3-2)$$

Where: t_c = time of concentration (minutes)
 L = maximum length of travel from headwater to outlet (feet)
 S = effective slope along L (feet per foot)

3.4.2 Urbanized Drainage Basins

Runoff from urbanized basins travels in three phases:

- Initial overland flow represents rainfall collecting on roof tops and making its way to an impervious surface, where runoff begins in earnest. This value is assumed to be ten minutes where a substantial area is drained, and five minutes when only street or parking lot sections are drained.
- Gutter flow represents the sheet flow of runoff over pavement, other impervious surfaces (e.g. street gutters), or pervious surfaces toward an initial collection point in the storm drain system. Calculations for this portion of the initial travel time shall be based upon nomographs included as Figure A-1 in Appendix A.
- Pipe flow in a storm drain collection system shall be calculated by dividing the distance between design points by the average flow velocity in the subject reach of pipe. (More detailed procedures regarding storm drain hydraulics are provided in Chapter 5 of this manual.) Since flow velocities may change between inlets or manholes due to changes in flow rate, pipe size, roughness, or slope, the total pipe flow time must be calculated as the sum of the time increments for each section of storm drain.

The total time of concentration to be used in the Rational Method calculation is the sum of the overland flow time plus any travel time in pipes, gutters, swales, or channels leading down to the point where the discharge is being determined.

Interpolation for Parameter 'A'							Interpolation for Parameter 'B'						
	5	0.269993						5	0.00358				
7			5	0.04527	0.009054	0.288101	7			5	0.003732	0.000746	0.0050728
	10	0.315263						10	0.007312				
11.4			5	0.106097	0.021219	0.34497	11.4			5	-0.000355	-7.1E-05	0.0072126
	15	0.42136						15	0.006957				
25			15	0.132574	0.008838	0.509743	25			15	0.0029	0.000193	0.00889033
	30	0.553934						30	0.009857				
45			30	0.072674	0.002422	0.590271	45			30	0.009344	0.000311	0.014529
	60	0.626608						60	0.019201				

Twenty-four-hour storm durations are used to establish rainfall intensity-duration-frequency (IDF) curves provided in Appendix B. The TDS Regional Equation is given by:

$$x_{T,D} = A_{T,D} + (B_{T,D} MAP) \quad (3-3)$$

Where: $x_{T,D}$ = precipitation depth for a specific return period and storm duration (inches)
 T = return period (years)
 D = storm duration (hours)
 $A_{T,D}, B_{T,D}$ = coefficients from Tables B-1 and -2 (dimensionless)
 MAP = Mean Annual Precipitation (inches)

The precipitation intensity, i , is given by:

$$i_{T,D} = \frac{x_{T,D}}{D} \quad (3-4)$$

Intensity-Duration-Frequency (IDF) curves for Mean Annual Precipitation (MAP) values of 15, 20, 25, 30, 35, and 40-inches are provided for users' convenience in Appendix B. Intensity curves for 2-, 5-, 10-, 25-, 50-, and 100-year return periods are shown for each of the IDF curves. Interpolation may be used to obtain IDF relationships for MAP values between those shown in Appendix B, or Equations 3-3 and 3-4 can be applied directly.

100-YR RETURN PERIOD		
5-min	0.269993	0.003580
10-min	0.315263	0.007312
15-min	0.421360	0.006957
30-min	0.553934	0.009857
1-hr	0.626608	0.019201
2-hr	0.732944	0.036193
3-hr	0.816471	0.051981
6-hr	0.776677	0.101053
12-hr	0.821859	0.162184
24-hr	0.814046	0.243391
48-hr	1.210895	0.325943
72-hr	1.175000	0.389038

CALPINE - TANAGER ENERGY STORAGE FACILITY - RATIONAL METHOD - INDIVIDUAL SUBAREA CALCULATIONS

PROPOSED CONDITIONS - 100-yr

Subarea	Initial Subarea Tc	Gutter Flow Length	Average Gutter Slope	Gutter Velocity	Gutter Flow Time	Swale Flow Length	Average Swale Slope	Swale Velocity	Swale Flow Time	Total Subarea Tc	Tc used for Peak Q calc	D	A	B	MAP	x	i	C	Area	Σ Product Area * Coefficient	Q (SUB)	Q (acumm)
	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(ft)	(ft/ft)	(ft/s)	(min)	(min)	(min)	(hr)					(in/hr)		(ac)		(cfs)	(cfs)
PR-T1	5	590	0.005	1.8	5.46					10.5	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.85	2.75	2.338	5.91	5.91
PR-T2	5	565	0.005	1.8	5.23					10.2	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.85	2.85	2.423	6.12	12.03
PR-T3	5	645	0.005	1.8	5.97					11.0	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.85	2.75	2.338	5.91	17.94
PR-T4	5	615	0.005	1.8	5.69					10.7	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.85	2.75	2.338	5.91	23.85
PR-T5	10	0	0							10.0	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.15	0.83	0.125	0.31	24.16
PR-T6	10	0	0							10.0	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.85	1.30	1.105	2.79	26.96
Subtotal																			13.23			
EX-LE1	5	472	0.005	2.75	2.86	693	0.0020	4.00	2.89	10.7	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.8	11.90	9.520	24.06	51.02
EX-LE2	5	266	0.008	2.75	1.61	522	0.0040	4.00	2.18	8.8	10	0.167	0.315263	0.007312	14.5	0.421287	2.527722	0.8	8.40	6.720	16.99	68.01
Subtotal																			20.30		41.05	
TOTAL																			33.53			

Rational Method Notes:

1. Existing conditions for the Tanager site is an undeveloped field with perennial grass (fair to good cover). Kirpich Formula (equation 3-2 per County Drainage Manual) is used for the undeveloped parcel
2. For existing LECF site and proposed Tanager site, "urbanized" conditions are used with an initial overland flow Tc of 5 minutes followed by gutter and swale flow times to the point of concentration.
3. Gutter flow time uses a street flow nomograph based on street slope, gutter 'n' of 0.015, and curb height of 6 inches. Velocity is estimated based on full curb height flow (conservative)
4. Swale velocity assumed at 4 fps (conservative value for time of concentration calculations).
5. Tanager site area taken as full parcel area of appr 576,320 sf = 13.23 ac
6. Rational Method Runoff coefficient based Drainage Manual Table 3-1.

HEC-HMS (SCS Curve Number Method) Notes:

7. Curve Number from Table E-1 (for HMS analysis) uses CN=35 (pervious) and CN=98 (impervio
- | | | | | |
|------|--|---------|------------|-------|
| 91.7 | for 90% impervious proposed Tanager site at AMC II | Use CN= | 81 1" Rain | AMC I |
| 91.1 | for 85% impervious existing LECF Basin 1 at AMC II | Use CN= | 80 1" Rain | AMC I |
| 85.4 | for 80% impervious existing LECF Basin 2 at AMC II | Use CN= | 71 1" Rain | AMC I |
8. Maximum Commercial/Industrial (80% Impervious) per Table E-1 with HSG 'D' = 79 (AMC II), 62 (AMC I), 91 (AMC III)

- Values calculated under Note 8 are slightly more conservative and were used in the HEC-HMS Analysis

3.4.1 Natural Watersheds

For natural watersheds with flow primarily in channels after an initial overland flow distance typically equal to about 300 feet, the Kirpich formula may be used:

$$t_e = 0.0078 \left(\frac{L^2}{S} \right)^{0.385} + 10 \quad (3-2)$$

Where: t_e = time of concentration (minutes)
 L = maximum length of travel from headwater to outlet (feet)
 S = effective slope along L (feet per foot)

3.4.2 Urbanized Drainage Basins

Runoff from urbanized basins travels in three phases:

- Initial overland flow represents rainfall collecting on roof tops and making its way to an impervious surface, where runoff begins in earnest. This value is assumed to be ten minutes where a substantial area is drained, and five minutes when only street or parking lot sections are drained.
- Gutter flow represents the sheet flow of runoff over pavement, other impervious surfaces (e.g. street gutters), or pervious surfaces toward an initial collection point in the storm drain system. Calculations for this portion of the initial travel time shall be based upon nomographs included as Figure A-1 in Appendix A.
- Pipe flow in a storm drain collection system shall be calculated by dividing the distance between design points by the average flow velocity in the subject reach of pipe. (More detailed procedures regarding storm drain hydraulics are provided in Chapter 5 of this manual.) Since flow velocities may change between inlets or manholes due to changes in flow rate, pipe size, roughness, or slope, the total pipe flow time must be calculated as the sum of the time increments for each section of storm drain.

The total time of concentration to be used in the Rational Method calculation is the sum of the overland flow time plus any travel time in pipes, gutters, swales, or channels leading down to the point where the discharge is being determined.

Interpolation for Parameter 'A'

5	0.269993
10	0.315263
15	0.42136
30	0.553934
45	
60	0.626608

Interpolation for Parameter 'B'

5	0.00358
10	0.007312
15	0.008957
30	0.009857
45	
60	0.019201

200-YR RETURN PERIOD

5-min	0.269993	0.003580
10-min	0.315263	0.007312
15-min	0.421360	0.006957
30-min	0.553934	0.009857
1-hr	0.626608	0.019201
2-hr	0.732944	0.036193
3-hr	0.816471	0.051981
6-hr	0.776677	0.101053
12-hr	0.821859	0.162184
24-hr	0.814046	0.243391
48-hr	1.210895	0.325943
72-hr	1.175000	0.389038

Intensity-Duration-Frequency (IDF) curves for Mean Annual Precipitation (MAP) values of 15, 20, 25, 30, 35, and 40 inches are provided for user convenience in Appendix B. Intensity curves for 2, 5, 10, 25, 50, and 100-year return periods are shown for each of the IDF curves. Interpolation may be used to obtain IDF relationships for MAP values between those shown in Appendix B, or Equations 3-3 and 3-4 can be applied directly.

CALPINE - TANAGER ENERGY STORAGE FACILITY - 10-YEAR RATIONAL METHOD - INDIVIDUAL SUBAREA Q10 CALCULATIONS

PROPOSED CONDITIONS - 100-yr

APWA METHOD DETENTION ANALYSIS

Setting maximum peak outflow = existing conditions peak flow

											Release Rate = 3.5 cfs	
Time (min)	D (hr)	A	B	MAP	x, 100-yr Depth (in)	Intensity (in/hr)	Avg. Runoff Coefficient	Area (ac)	Q (cfs)	Runoff Volume (cu-ft)	Release Flow Volume (cu-ft)	Required Storage Volume (cu-ft)
10	0.17	0.315263	0.007312	14.5	0.421287	2.527722	0.900	13.23	30.10	18059	2100	15959
15	0.25	0.42136	0.006957	14.5	0.5222365	2.088946	0.900	13.23	24.87	22386	3150	19236
20	0.33	0.46555133	0.007923667	14.5	0.5804445	1.741334	0.900	13.23	20.73	24881	4200	20681
25	0.42	0.50974267	0.008890333	14.5	0.6386525	1.532766	0.900	13.23	18.25	27376	5250	22126
30	0.50	0.553934	0.009857	14.5	0.6968605	1.393721	0.900	13.23	16.60	29871	6300	23571
35	0.58	0.56604633	0.011414333	14.5	0.731554167	1.254093	0.900	13.23	14.93	31358	7350	24008
40	0.67	0.57815867	0.012971667	14.5	0.766247833	1.149372	0.900	13.23	13.69	32845	8400	24445
45	0.75	0.590271	0.014529	14.5	0.8009415	1.067922	0.900	13.23	12.72	34333	9450	24883
50	0.83	0.60238333	0.016086333	14.5	0.835635167	1.002762	0.900	13.23	11.94	35820	10500	25320
55	0.92	0.61449567	0.017643667	14.5	0.870328833	0.94945	0.900	13.23	11.31	37307	11550	25757
60	1	0.626608	0.019201	14.5	0.9050225	0.905023	0.900	13.23	10.78	38794	12600	26194
110	1.833333	0.71522133	0.033361	14.5	1.198955833	0.653976	0.900	13.23	7.79	51393	23100	28293
120	2	0.732944	0.036193	14.5	1.2577425	0.628871	0.900	13.23	7.49	53913	25200	28713
130	2.166667	0.74686517	0.038824333	14.5	1.309818	0.604531	0.900	13.23	7.20	56146	27300	28846
180	3	0.816471	0.051981	14.5	1.5701955	0.523399	0.900	13.23	6.23	67307	37800	29507
190	3.166667	0.81426022	0.054707222	14.5	1.607514944	0.507636	0.900	13.23	6.04	68906	39900	29006
360	6	0.776677	0.101053	14.5	2.2419455	0.373658	0.900	13.23	4.45	96101	75600	20501
720	12	0.821859	0.162184	14.5	3.173527	0.264461	0.900	13.23	3.15	136034	151200	-15166
1440	24	0.814046	0.243391	14.5	4.3432155	0.180967	0.900	13.23	2.15	186173	302400	-116227

Note: 100-year Runoff Coefficient increased to 0.90 to account for antecedent moisture condition

Interpolation for Parameter 'A'

5	0.2699993
9.6	
10	0.315263
10.3	
15	0.42136
25	
30	0.553934
55	
60	0.626608
110	
120	0.732944
130	
180	0.816471
190	
360	0.776677
400	
720	0.821859
1000	
1440	0.814046

Interpolation for Parameter 'B'

5	0.00358
9.6	
10	0.007312
10.3	
15	0.006957
25	
30	0.009857
55	
60	0.019201
110	
120	0.036193
130	
180	0.051981
190	
360	0.101053
400	
720	0.162184
1000	
1440	0.243391

CALPINE - TANAGER ENERGY STORAGE FACILITY - BASIN VOLUME

Tanager Site Basin

Stage	Area	Inc. Depth (ft)	Avg Area (sq. ft)	Inc. Vol (cu-ft)	Cumm Vol. (cu-ft)	Cumm Vol. (ac-ft)	Basin Ponding Depth for 1" Rain Event (ft)
0	8955				0	0	2.61
1	14555	1	11755	11755	11755	0.26986	
2	20265	1	17410	17410	29165	0.66954	
3	26135	1	23200	23200	52365	1.20213	
4	32070	1	29102.5	29102.5	81467.5	1.87024	

Volume of runoff from Rainfall of :

Rainfall (inches)	Site Area (acres)	Site Area (sq. ft)	C Value	Runoff Volume (cu-ft)	Runoff Vol (gallons)
1	13.23	576,299	0.807	38,756	289,916
1	13.23	576,299	0.85	40,821	305,364
1	13.23	576,299	0.9	43,222	323,326

1-inch rain at the site is approximately equivalent to:

1-year, 12-hr storm (1.06 inches)

2-year, 6-hr storm (1.20 inches)

10-year, 2-hr storm (0.91 inch)

100-year, 1-hr storm (1.03 inches)

Tanager Site Water Quality Treatment Flowrates and Volumes

85th percentile, 24-hour storm depth= 0.51 inch
 SC Valley WQ (C3 Guidelines) = 0.52 inch
 CASQA Unit Basin Storage Volume = 0.53 inch

Runoff (C=0.85)
 21669 cu-ft
22093 cu-ft
 22518 cu-ft

WQ	Basin Depth @
Vol (cu-ft)	WQ vol. (ft)
22093	1.59

Water quality flow rate (0.2 in/hr) = **2.34 cfs**

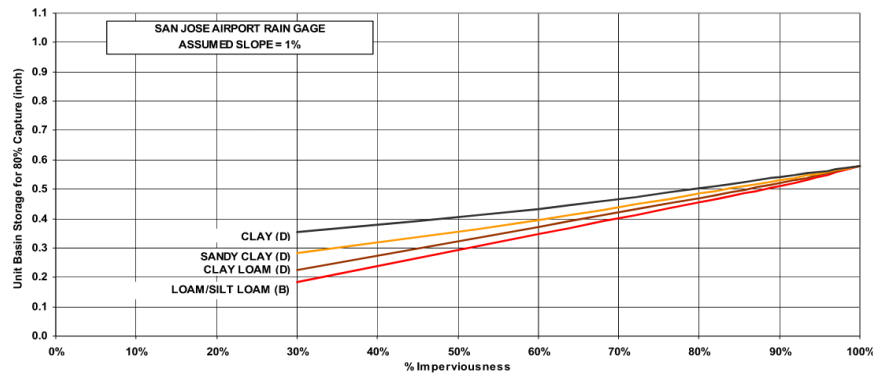
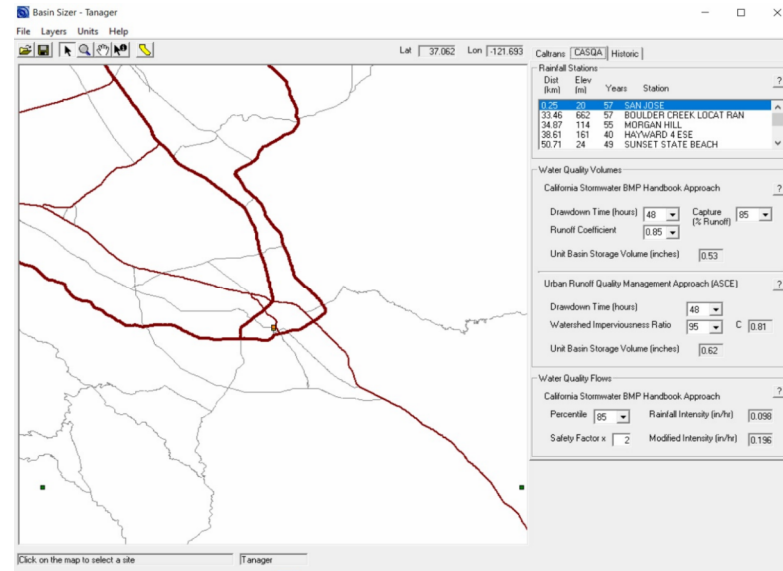
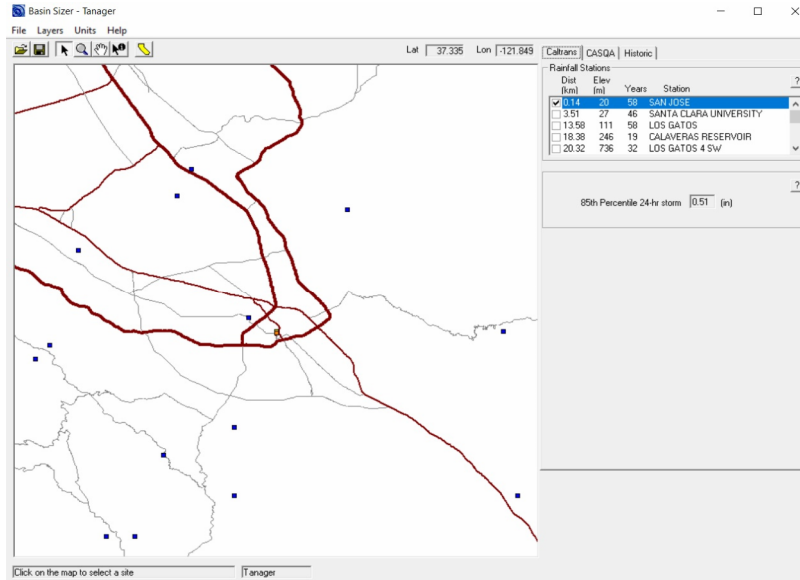


Figure B-2 Unit Basin Volume for 80% Capture - San Jose Airport Rain Gage

CALPINE - LECEF - BASIN VOLUME

SOUTH SWALE

Stage	Area	Inc. Depth (ft)	Avg Area (sq. ft)	Inc. Vol (cu-ft)	Cumm Vol. (cu-ft)	Cumm Vol. (ac-ft)	Assumed Outflow (cfs)
15.5	0				0	0	0
		0.5	1717	858.5			
16	3434				858.5	0.01971	19
		1	8005	8005			
17	12576				8863.5	0.20348	33
		1	22763	22763			
18	32950				31626.5	0.72604	43
		0.5	49938	24969			
18.5	66926				56595.5	1.29925	47

Note: Assumed outflow is orifice flow through a grate inlet with clear opening of 8 square feet

Volume of runoff from Rainfall of :

Rainfall (inches)	Site Area (acres)	Site Area (sq. ft)	C Value	Runoff Volume (cu-ft)	Runoff Vol (gallons)
1	11.9	518,364	0.8	34,558	258,509
1	11.9	518,364	0.85	36,717	274,666
1	11.9	518,364	0.9	38,877	290,822

1-inch rain at the site is approximately equivalent to:

1-year, 12-hr storm (1.06 inches)

2-year, 6-hr storm (1.20 inches)

10-year, 2-hr storm (0.91 inch)

100-year, 1-hr storm (1.03 inches)

CALPINE - LECEF - BASIN VOLUME

EAST SWALE

Stage	Area	Inc. Depth (ft)	Avg Area (sq. ft)	Inc. Vol (cu-ft)	Cumm Vol. (cu-ft)	Cumm Vol. (ac-ft)	Assumed Outflow (cfs)
15.8	0				0	0	0
		0.2	83.5	16.7			
16	167				16.7	0.00038	12
		1	813.5	813.5			
17	1460				830.2	0.01906	30
		1	6172.5	6172.5			
18	10885				7002.7	0.16076	40
		0.5	21721	10860.5			
18.5	32557				17863.2	0.41008	45

Note: Assumed outflow is orifice flow through a grate inlet with clear opening of 8 square feet

Volume of runoff from Rainfall of :

Rainfall (inches)	Site Area (acres)	Site Area (sq. ft)	C Value	Runoff Volume (cu-ft)	Runoff Vol (gallons)
1	8.4	365,904	0.8	24,394	182,477
1	8.4	365,904	0.85	25,918	193,882
1	8.4	365,904	0.9	27,443	205,286

1-inch rain at the site is approximately equivalent to:

1-year, 12-hr storm (1.06 inches)

2-year, 6-hr storm (1.20 inches)

10-year, 2-hr storm (0.91 inch)

100-year, 1-hr storm (1.03 inches)

CALPINE - LECEF - PUMP STATION VOLUME

PUMP STATION

Stage	Area	Inc. Depth (ft)	Avg Area (sq. ft)	Inc. Vol (cu-ft)	Cumm Vol. (cu-ft)	Cumm Vol. (ac-ft)	Assumed Outflow (cfs)
0					0	0	0
18	78.5			1413	2826	0.06488	100 ²

Notes:

1. Pump Station sumps are two 10 foot diameter wet wells (18 feet deep)
2. Assumed outflow from pumps set arbitrarily high with assumption that pumps will not be limiting factor.

Volume of runoff from Rainfall of :

Rainfall (inches)	Site Area (acres)	Site Area (sq. ft)	C Value	Runoff Volume (cu-ft)	Runoff Vol (gallons)
1	20.3	884,268	0.8	58,951	440,986
1	20.3	884,268	0.85	62,636	468,547
1	20.3	884,268	0.9	66,320	496,109

1-inch rain at the site is approximately equivalent to:

- 1-year, 12-hr storm (1.06 inches)
- 2-year, 6-hr storm (1.20 inches)
- 10-year, 2-hr storm (0.91 inch)
- 100-year, 1-hr storm (1.03 inches)

CALPINE - LECEF - STORAGE TANK

1 Million Gallon Storage Tank

Stage	Area	Inc. Depth (ft)	Avg Area (sq. ft)	Cumm Vol. gallons	Cumm Vol. (cu-ft)	Cumm Vol. (ac-ft)	Assumed Outflow (cfs)
0	0						0
19.77	4415.63			653,184	87,318	2.00455	0
19.90	4415.63			657,320	87,871	2.01724	0.586579
27.83	4415.63			919,296	122,892	2.82121	0.586579
						2.83	100

Notes

- Storage Tank Capacity = 919,296 gallons; Operating Capacity = 653,184 gallons (approximately 2/3 full)
- Assume flow is discharged when storage tank reaches 2/3 full (volume = 653,184 gallons).
- Discharge is set at maximum of 379,116 gallons per day or 0.586 cubic feet per second

Volume of runoff from Rainfall of :

Rainfall (inches)	Site Area (acres)	Site Area (sq. ft)	C Value	Runoff Volume (cu-ft)	Runoff Vol (gallons)
1	20.3	884,268	0.8	58,951	440,986
1	20.3	884,268	0.85	62,636	468,547
1	20.3	884,268	0.9	66,320	496,109

1-inch rain at the site is approximately equivalent to:

- 1-year, 12-hr storm (1.06 inches)
- 2-year, 6-hr storm (1.20 inches)
- 10-year, 2-hr storm (0.91 inch)
- 100-year, 1-hr storm (1.03 inches)

gal	CONVERT	cu-ft	
379,116.00	7.48052	50,680	0.5866 cfs max outflow = 263.275
653,184.00	7.48052	87,318	
919,296	7.48052	122,892	

The cooling tower basin has a maximum capacity of approximately 919,296 gallons. The working capacity is approximately 653,184 gallons. If the cooling tower nears the working capacity, the facility has the ability to discharge from the cooling tower basin to the sanitary sewer. The facility's discharge permit allows a maximum of 379,116 gallons to be discharged to the sewer system daily. This allows the facility to maintain capacity for rainfall usage. If the cooling tower experiences a mechanical issue with the pumps, the water would be pumped to Coyote Creek, at which point a discharge sample would be

HYDROLOGY ANALYSIS SUMMARY

Tanager and LECEF Combined Hydrology Summary

1-inch Storm Event

HEC-HMS SUMMARY

Location	Cummulative Area (acres)	Existing 1-inch Storm Peak Flow (cfs)	Existing 1-inch Storm Runoff Volume (ac-ft)	Proposed 1-inch Storm Peak Flow (cfs)	Proposed 1-inch Storm Runoff Volume (ac-ft)
Tanager Site	13.23	0.3	0.1	6.7	1.0
LECEF South Site	11.90	5.7	0.9	5.7	0.9
LECEF South Swale	25.13	6.2	1	6	0.9
LECEF East Site	8.40	3.8	0.6	3.8	0.6
LECEF East Swale	33.53	10.1	1.6	9.8	1.5
LECEF Pump Station	33.53	10.2	1.6	9.9	1.5
LECEF Storage Tank	33.53	0	0	0	0

Proposed 1-inch Storm Runoff Vol (cu-ft)	Proposed 1-inch Storm Runoff Vol (gallons)
43,560	325,851
39,204	293,266
39,204	293,266
26,136	195,511
65,340	488,777
65,340	488,777

Notes:

- 1) 1-inch Existing and Proposed condition storm event runoff can be accommodated in onsite stormwater storage tank without discharging. The total runoff volume produced from 1-inch storm event is 1.5 ac-ft in proposed condition.
- 2) The working capacity of the tank is approximately 2.0 acre-feet (653,184 gallons)
- 3) At the working capacity of about 2.0 ac-ft, the storage tank can accommodate a 1.2-inch rainfall event, before discharging.

10-year Storm Event

HEC-HMS SUMMARY

Location	Cummulative Area (acres)	Existing 10-yr Storm Peak Flow (cfs)	Existing 10-yr Storm Runoff Volume (ac-ft)	Proposed 10-yr Storm Peak Flow (cfs)	Proposed 10-yr Storm Runoff Volume (ac-ft)
Tanager Site	13.23	2.8	0.8	18.9	2.9
Tanager Basin	13.23	n/a	n/a	2.5	1.8
LECEF South Site	11.90	16.5	2.5	16.5	2.5
LECEF South Swale	25.13	19.1	3.3	17.2	4.3
LECEF East Site	8.40	11.2	1.7	11.2	1.7
LECEF East Swale	33.53	29.2	5.0	27.4	6.0
LECEF Pump Station	33.53	29.1	5.0	27.4	6.0
LECEF Storage Tank	33.53	-		-	

Rational Method Existing RM Peak Flow (cfs)	Undetained Proposed RM Peak Flow (cfs)
2.47	19.9
n/a	19.9
17.7	17.7
20.2	37.6
12.5	12.5
32.7	50.1
32.7	50.1

Note: 10-year storm event would surcharge the existing LECEF storage tank. Excess runoff would need to be discharged, after the tank reached its working capacity. 4.0 acre-feet of runoff volume would require discharge.

100-year Storm Event

HEC-HMS SUMMARY

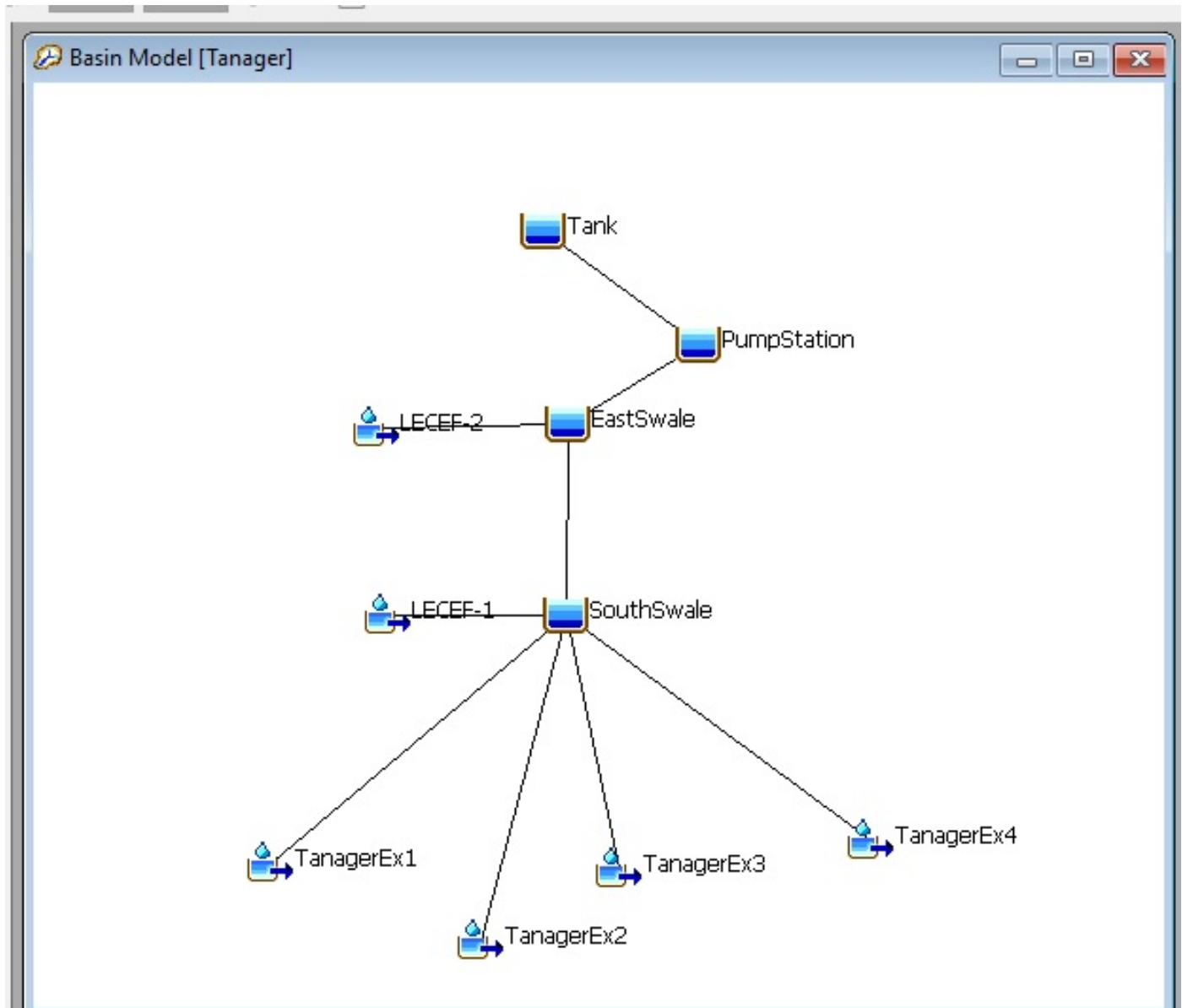
Location	Cummulative Area (acres)	Existing 100-yr Storm Peak Flow (cfs)	Existing 100-yr Storm Runoff Volume (ac-ft)	Proposed 100-yr Storm Peak Flow (cfs)	Proposed 100-yr Storm Runoff Volume (ac-ft)
Tanager Site	13.23	11.1	2.5	31.2	4.7
Tanager Basin	13.23	n/a	n/a	11.1	3.6
LECEF South Site	11.90	27.7	4.2	27.7	4.2
LECEF South Swale	25.13	27.3	6.8	23.7	7.7
LECEF East Site	8.40	19.4	2.9	19.4	2.9
LECEF East Swale	33.53	36.5	9.7	35.2	10.6
LECEF Pump Station	33.53	37.1	9.7	35.2	10.6
LECEF Storage Tank	33.53	-		-	

Rational Method Existing RM Peak Flow (cfs)	Undetained Proposed RM Peak Flow (cfs)
3.7	27
n/a	27
24.1	24.1
20.2	51
17	17
32.7	68
32.7	68

Note: 100-year storm event would surcharge the existing LECEF storage tank. Excess runoff would need to be discharged, after the tank had reached its working capacity. 4.2 acre-feet of runoff volume would require discharge.

HEC-HMS
EXISTING CONDITION
SUMMARY OUTPUT

HEC-HMS
EXISTING CONDITIONS
SUB-BASIN LAYOUT



HEC-HMS

EXISTING CONDITIONS

1-INCH RAINFALL STORM EVENT

Global Summary Results for Run "1-inch Rain"

Project: 1-in_Tanager-LECEF-Exist Simulation Run: 1-inch Rain

Start of Run: 01Jan2000, 00:00

Basin Model: Tanager

End of Run: 02Jan2000, 00:00

Meteorologic Model: 1-inch Rain

Compute Time: 27Dec2024, 01:38:05

Control Specifications: Control

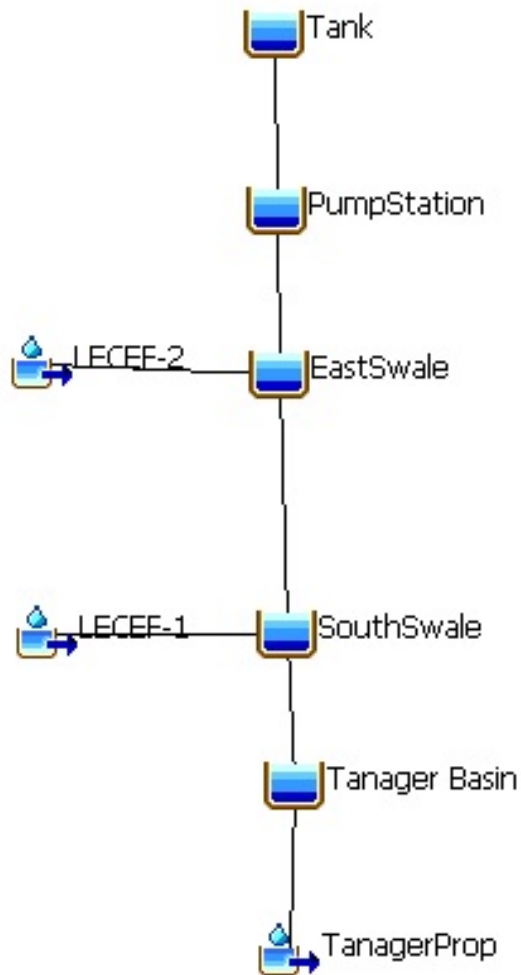
Show Elements: All Elements

Volume Units: ☐ IN ☒ ACRE-FT

Sorting: Watershed Explorer

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
LECEF-1	0.0	5.7	1 January 2000, 06:05	0.9
TanagerEx1	0.0	0.3	1 January 2000, 06:10	0.1
TanagerEx4	0.0	0.0	1 January 2000, 06:05	0.0
TanagerEx3	0.0	0.0	1 January 2000, 06:05	0.0
TanagerEx2	0.0	0.0	1 January 2000, 06:05	0.0
SouthSwale	0.0	6.2	1 January 2000, 06:05	1.0
LECEF-2	0.0	3.8	1 January 2000, 06:05	0.6
EastSwale	0.1	10.1	1 January 2000, 06:05	1.6
PumpStation	0.1	10.2	1 January 2000, 06:05	1.6
Tank	0.1	0.0	31 December 1999,...	0.0

HEC-HMS
PROPOSED CONDITIONS
SUB-BASIN SETUP



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

Global Summary Results for Run "1-inch Rain"

— □ ×

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain

Start of Run: 01Jan2000, 00:00

Basin Model: Tanager

End of Run: 02Jan2000, 00:00

Meteorologic Model: 1-inch Rain

Compute Time:

Control Specifications: Control

Show Elements: All Elements ▾

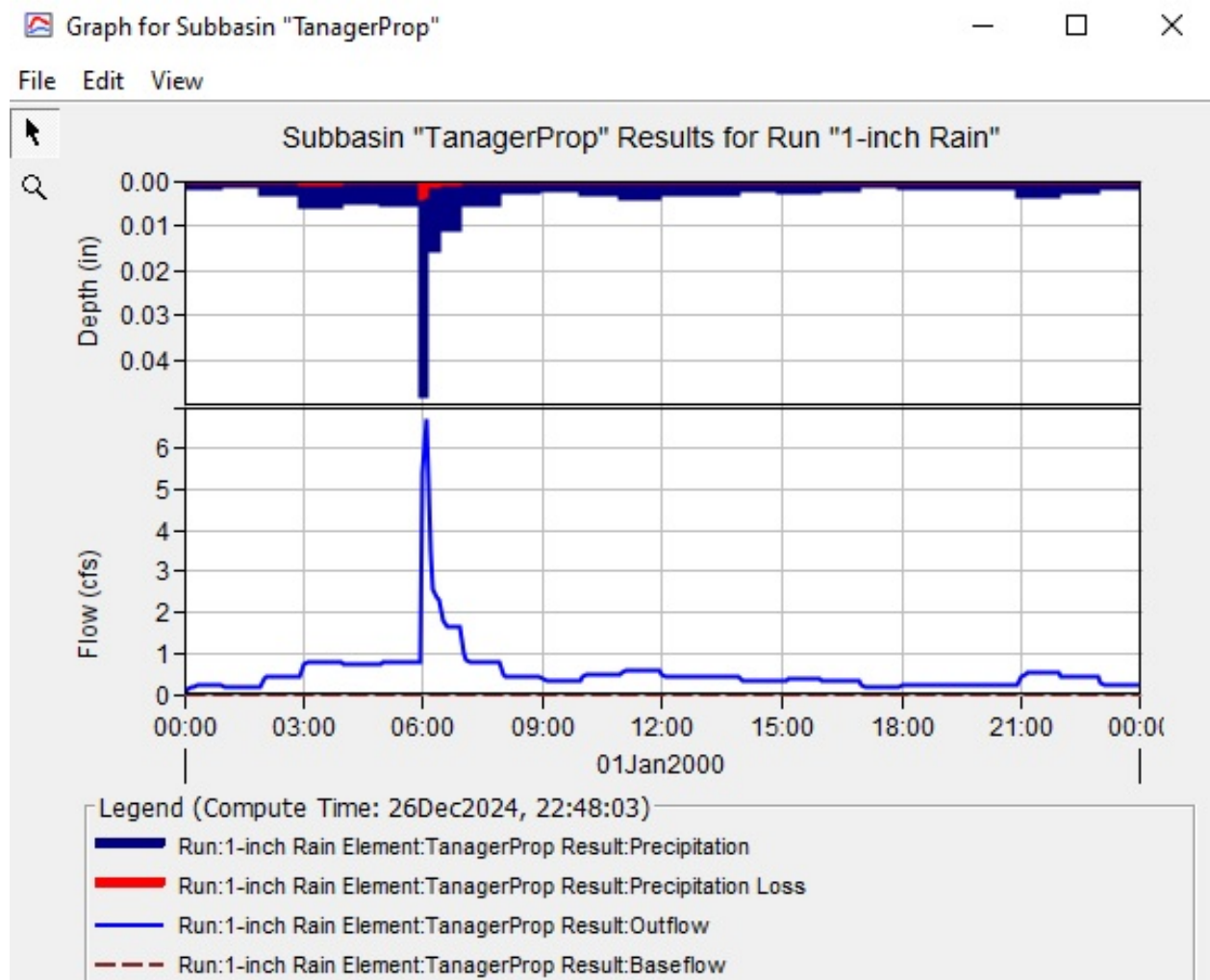
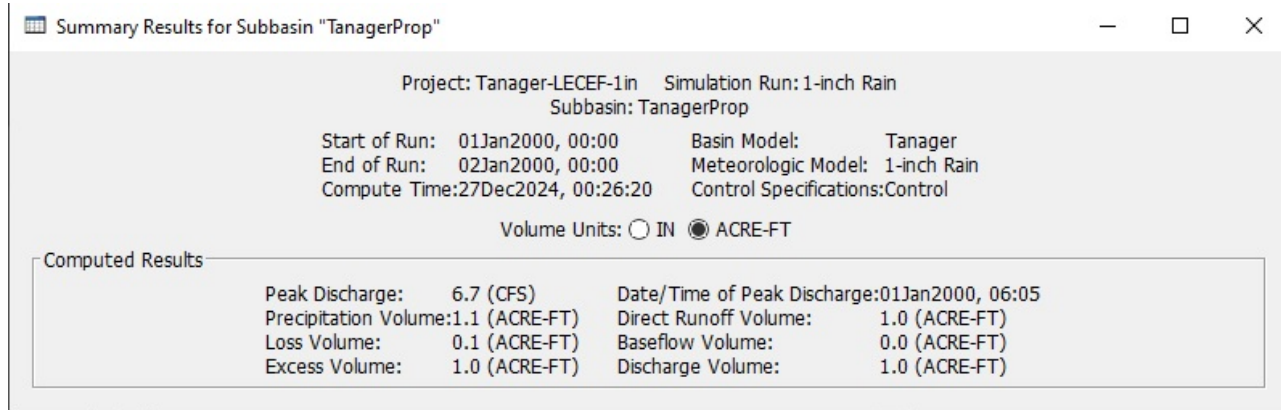
Volume Units: ☐ IN ☒ ACRE-FT

Sorting: Watershed Explorer ▾

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
TanagerProp	0.0	6.7	1 January 2000, 06:05	1.0
Tanager Basin	0.0	0.2	1 January 2000, 24:00	0.0
LECEF-1	0.0	5.7	1 January 2000, 06:05	0.9
SouthSwale	0.0	6.0	1 January 2000, 06:05	0.9
LECEF-2	0.0	3.8	1 January 2000, 06:05	0.6
EastSwale	0.1	9.8	1 January 2000, 06:05	1.5
PumpStation	0.1	9.9	1 January 2000, 06:05	1.5
Tank	0.1	0.0	31 December 1999, ...	0.0

HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

Tanager Site Runoff



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

Tanager Proposed Basin

Summary Results for Reservoir "Tanager Basin"

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain
Reservoir: Tanager Basin

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1-inch Rain
Compute Time: 26Dec2024, 22:48:03 Control Specifications: Control

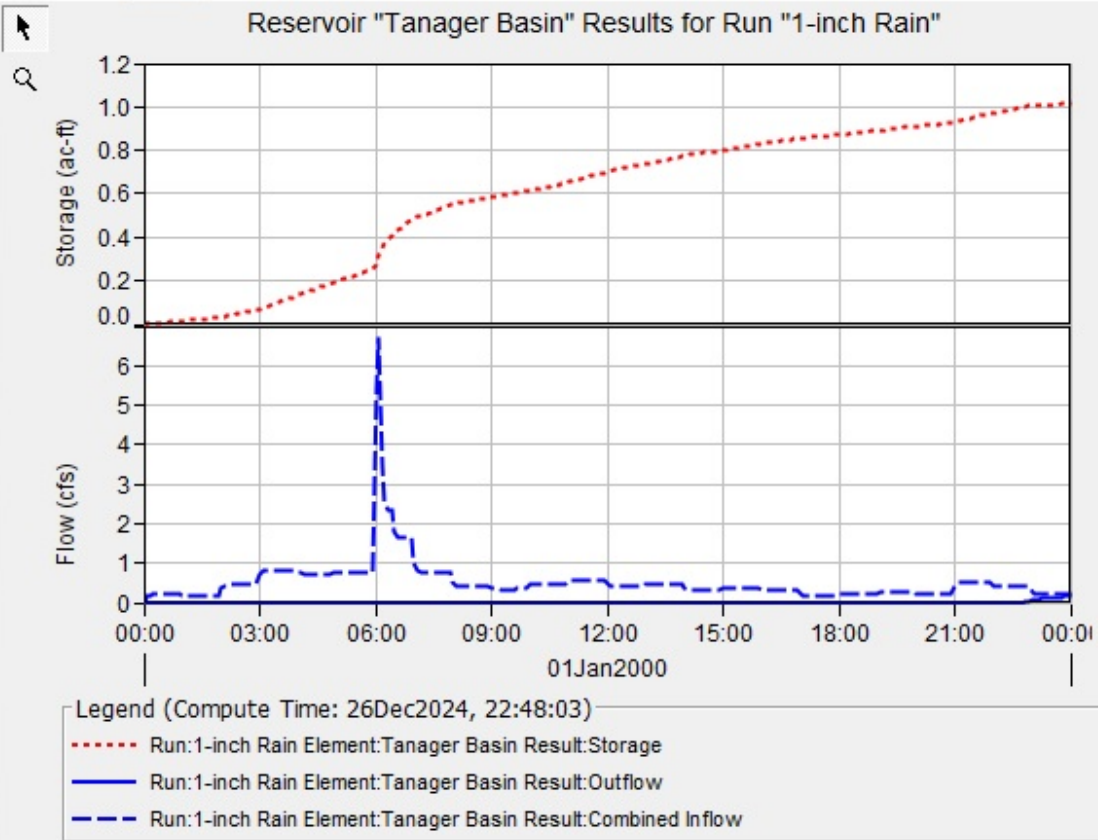
Volume Units: ☐ IN ☒ ACRE-FT

Computed Results

Peak Inflow: 6.7 (CFS)	Date/Time of Peak Inflow: 01Jan2000, 06:05
Peak Discharge: 0.2 (CFS)	Date/Time of Peak Discharge: 02Jan2000, 00:00
Inflow Volume: 1.0 (ACRE-FT)	Peak Storage: 1.0 (ACRE-FT)
Discharge Volume: 0.0 (ACRE-FT)	

Graph for Reservoir "Tanager Basin"

File Edit View



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

LECEF 1 - South Site Runoff

Summary Results for Subbasin "LECEF-1"

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain
Subbasin: LECEF-1

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1-inch Rain
Compute Time: 27Dec2024, 00:26:20 Control Specifications: Control

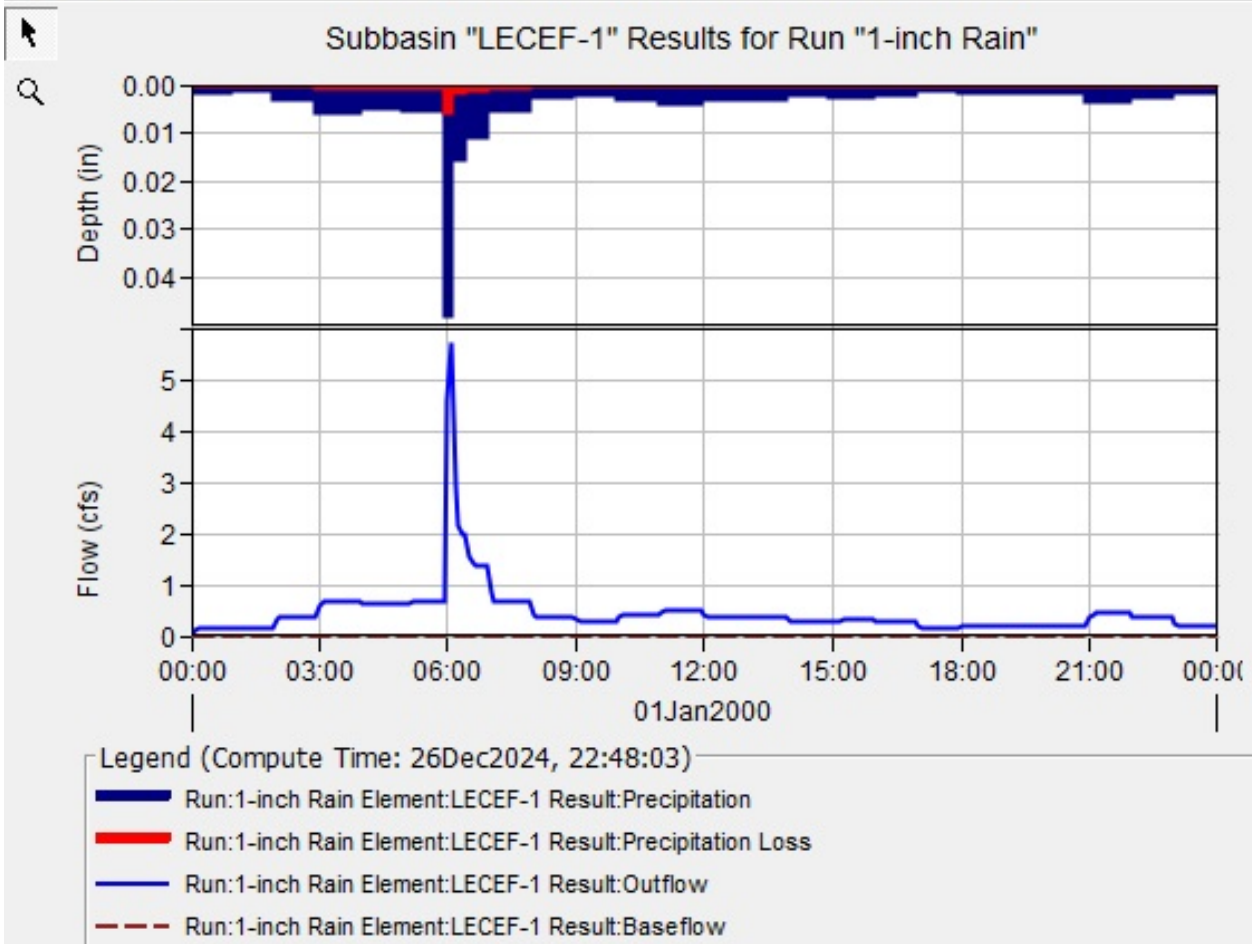
Volume Units: ☐ IN ☒ ACRE-FT

Computed Results

Peak Discharge:	5.7 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 06:05
Precipitation Volume:	1.0 (ACRE-FT)	Direct Runoff Volume:	0.9 (ACRE-FT)
Loss Volume:	0.1 (ACRE-FT)	Baseflow Volume:	0.0 (ACRE-FT)
Excess Volume:	0.9 (ACRE-FT)	Discharge Volume:	0.9 (ACRE-FT)

Graph for Subbasin "LECEF-1"

File Edit View



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

LECEF - South Swale

Summary Results for Reservoir "SouthSwale"

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain
Reservoir: SouthSwale

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1-inch Rain
Compute Time: 27Dec2024, 00:26:20 Control Specifications: Control

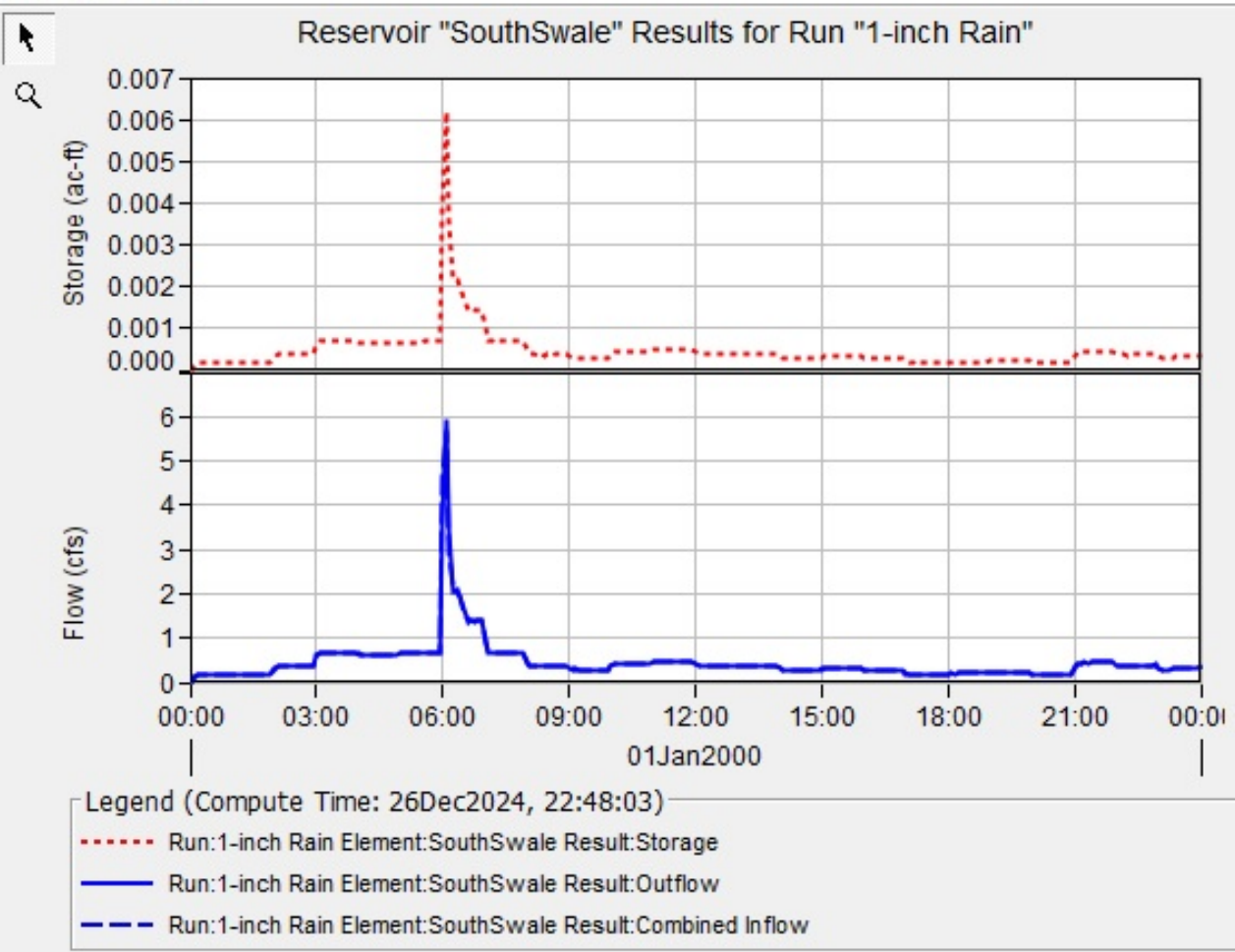
Volume Units: ☐ IN ☒ ACRE-FT

Computed Results

Peak Inflow:	5.7 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 06:05
Peak Discharge:	6.0 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 06:05
Inflow Volume:	0.9 (ACRE-FT)	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	0.9 (ACRE-FT)		

Graph for Reservoir "SouthSwale"

File Edit View



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

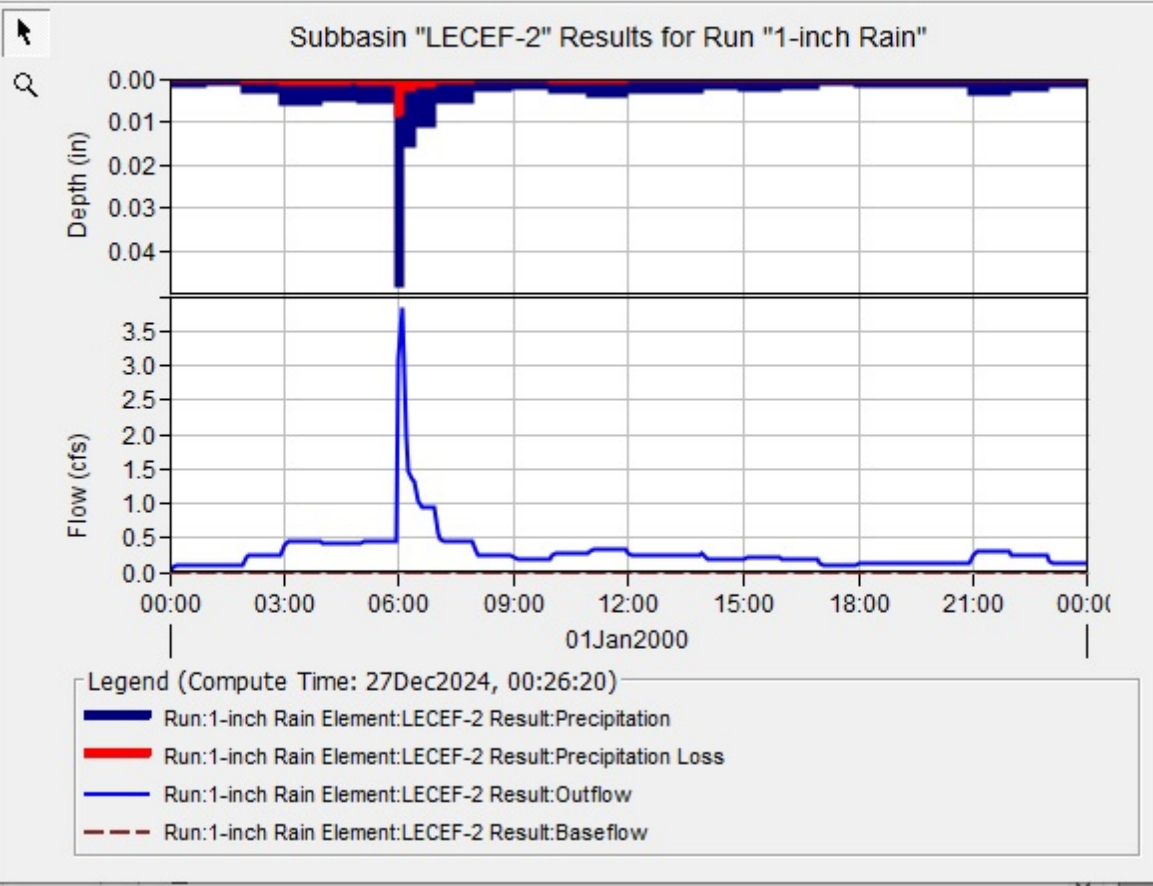
LECEF 2 - East Site Runoff

Summary Results for Subbasin "LECEF-2"

Project: Tanager-LECEF-1in		Simulation Run: 1-inch Rain	
		Subbasin: LECEF-2	
Start of Run:	01Jan2000, 00:00	Basin Model:	Tanager
End of Run:	02Jan2000, 00:00	Meteorologic Model:	1-inch Rain
Compute Time:	27Dec2024, 00:26:20	Control Specifications:	Control
Volume Units: ☐ IN ☒ ACRE-FT			
Computed Results			
Peak Discharge:	3.8 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 06:05
Precipitation Volume:	0.7 (ACRE-FT)	Direct Runoff Volume:	0.6 (ACRE-FT)
Loss Volume:	0.1 (ACRE-FT)	Baseflow Volume:	0.0 (ACRE-FT)
Excess Volume:	0.6 (ACRE-FT)	Discharge Volume:	0.6 (ACRE-FT)

Graph for Subbasin "LECEF-2"

File Edit View



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

LECEF - East Swale

Summary Results for Subbasin "LECEF-2"

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain

Subbasin: LECEF-2

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1-inch Rain
Compute Time: 27Dec2024, 00:26:20 Control Specifications: Control

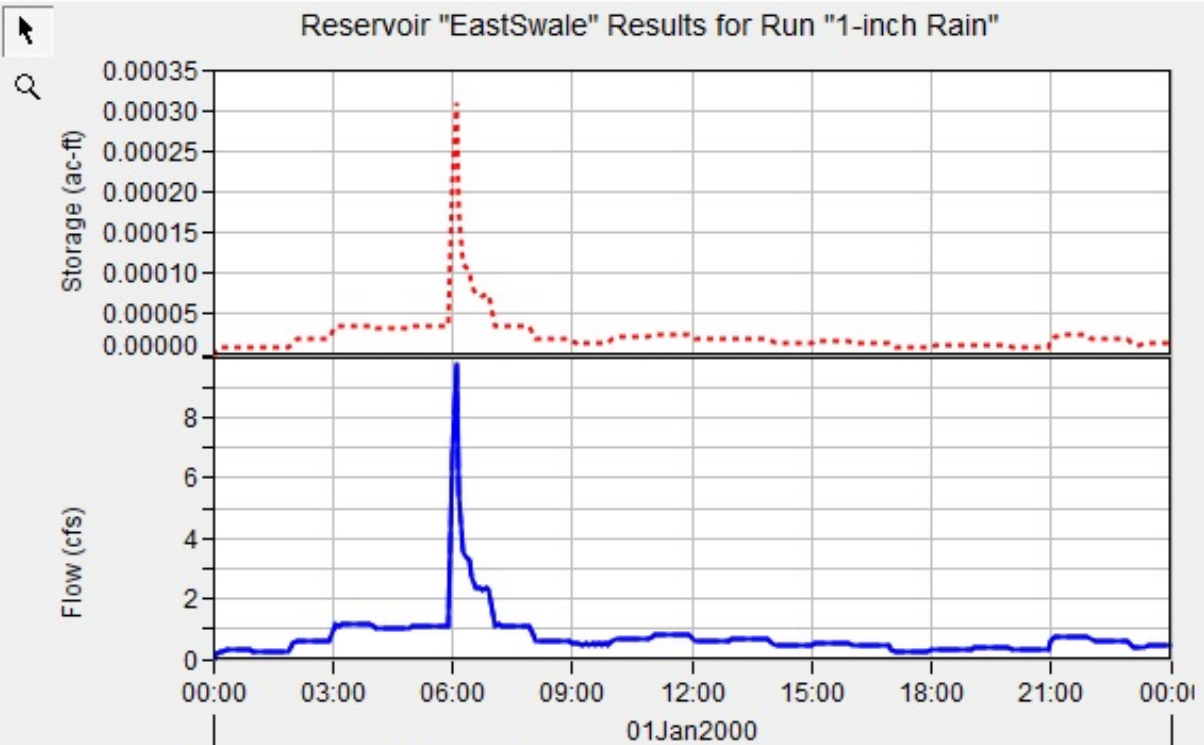
Volume Units: ☐ IN ☒ ACRE-FT

Computed Results

Peak Discharge:	3.8 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 06:05
Precipitation Volume:	0.7 (ACRE-FT)	Direct Runoff Volume:	0.6 (ACRE-FT)
Loss Volume:	0.1 (ACRE-FT)	Baseflow Volume:	0.0 (ACRE-FT)
Excess Volume:	0.6 (ACRE-FT)	Discharge Volume:	0.6 (ACRE-FT)

Graph for Reservoir "EastSwale"

File Edit View



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

LECEF - Pump Station

Summary Results for Reservoir "PumpStation"

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain
Reservoir: PumpStation

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1-inch Rain
Compute Time: 27Dec2024, 09:08:03 Control Specifications: Control

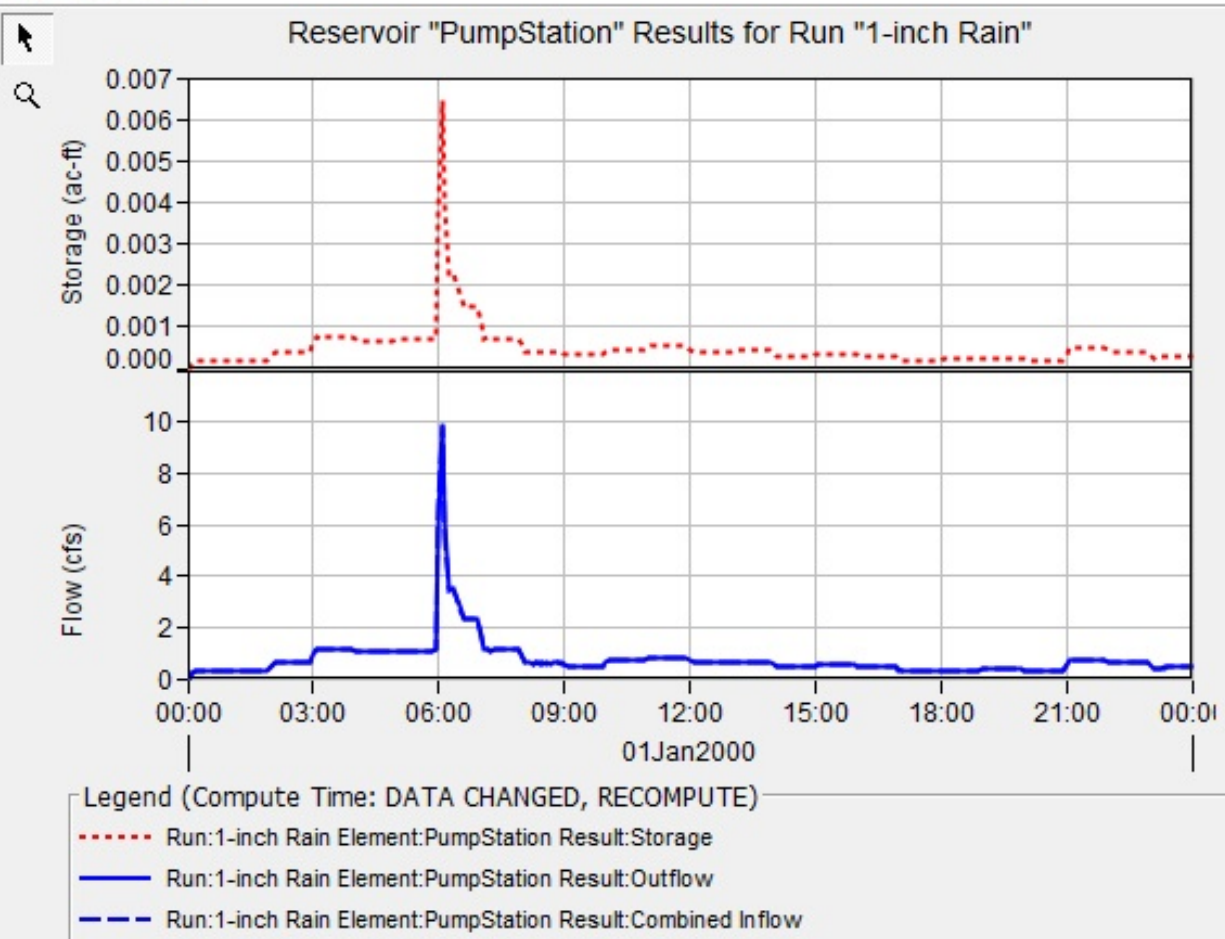
Volume Units: ☐ IN ☒ ACRE-FT

Computed Results

Peak Inflow:	9.8 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 06:05
Peak Discharge:	9.9 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 06:05
Inflow Volume:	1.5 (ACRE-FT)	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	1.5 (ACRE-FT)		

Graph for Reservoir "PumpStation"

File Edit View



HEC-HMS PROPOSED CONDITIONS 1-INCH RAINFALL STORM EVENT

LECEF - Storage Tank

Summary Results for Reservoir "Tank"

Project: Tanager-LECEF-1in Simulation Run: 1-inch Rain
Reservoir: Tank

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1-inch Rain
Compute Time: DATA CHANGED, RECOMPUTE Control Specifications: Control

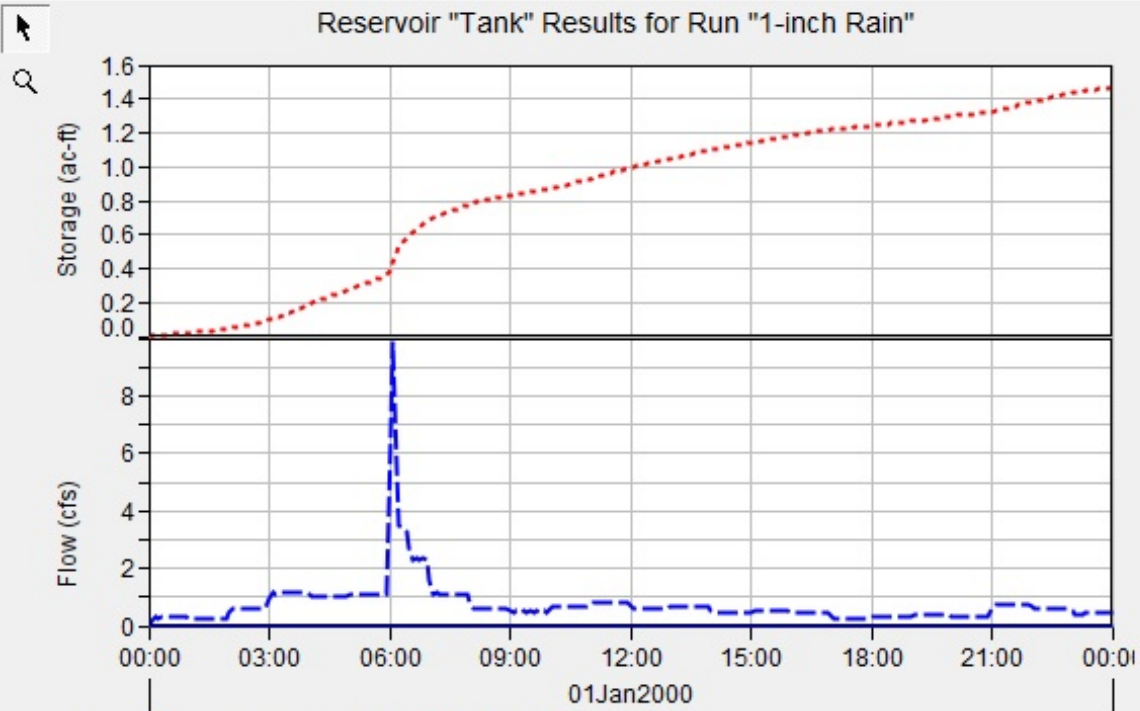
Volume Units: ☐ IN ☒ ACRE-FT

Computed Results

Peak Inflow:	9.9 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 06:05
Peak Discharge:	0.0 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 00:00
Inflow Volume:	1.5 (ACRE-FT)	Peak Storage:	1.5 (ACRE-FT)
Discharge Volume:	0.0 (ACRE-FT)		

Graph for Reservoir "Tank"

File Edit View



Legend (Compute Time: 26Dec2024, 22:48:03)

..... Run:1-inch Rain Element:Tank Result:Storage
———— Run:1-inch Rain Element:Tank Result:Outflow
- - - - Run:1-inch Rain Element:Tank Result:Combined Inflow

HEC-HMS
EXISTING CONDITIONS
1.25-INCH RAINFALL STORM EVENT

LECEF - Storage Tank

Global Summary Results for Run "Test Rain"

Project: Iter_Tanager_LECEF_Exist Simulation Run: Test Rain

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1.25-inch Rain
Compute Time: 27Dec2024, 02:01:50 Control Specifications: Control

Show Elements: All Elements Volume Units: ☐ IN ☒ ACRE-FT Sorting: Watershed Explorer

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
LECEF-1	0.0	7.2	1 January 2000, 06:05	1.1
TanagerEx1	0.0	0.4	1 January 2000, 06:10	0.1
TanagerEx4	0.0	0.0	1 January 2000, 06:05	0.0
TanagerEx3	0.0	0.0	1 January 2000, 06:05	0.0
TanagerEx2	0.0	0.0	1 January 2000, 06:05	0.0
SouthSwale	0.0	7.9	1 January 2000, 06:05	1.2
LECEF-2	0.0	4.8	1 January 2000, 06:05	0.7
EastSwale	0.1	12.6	1 January 2000, 06:05	2.0
PumpStation	0.1	12.7	1 January 2000, 06:05	2.0
Tank	0.1	0.0	31 December 1999, 24:00	0.0

PROPOSED CONDITIONS
1.20-INCH RAINFALL STORM EVENT
LECEF - Storage Tank

Global Summary Results for Run "Test Rain"

Project: Tanager_LECEF_Prop_Test Simulation Run: Test Rain

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 1.2-inch Rain
Compute Time: 27Dec2024, 02:09:20 Control Specifications: Control

Show Elements: All Elements Volume Units: ☐ IN ☒ ACRE-FT Sorting: Watershed Explorer

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
TanagerProp	0.0	8.1	1 January 2000, 06:05	1.2
Tanager Basin	0.0	0.5	1 January 2000, 22:10	0.2
LECEF-1	0.0	6.9	1 January 2000, 06:05	1.1
SouthSwale	0.0	7.2	1 January 2000, 06:05	1.3
LECEF-2	0.0	4.6	1 January 2000, 06:05	0.7
EastSwale	0.1	11.9	1 January 2000, 06:05	2.0
PumpStation	0.1	12.0	1 January 2000, 06:05	2.0
Tank	0.1	0.0	31 December 1999, ...	0.0

HEC-HMS

10-YEAR, 24-HR RAINFALL STORM EVENT

SUMMARY OUTPUT

EXISTING CONDITION OUTPUT

Global Summary Results for Run "10-yr, 24hr Storm"

Project: 10yr_Tanager_LECEF_Exist Simulation Run: 10-yr, 24hr Storm

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 10-yr, 24-hr Storm
Compute Time: 27Dec2024, 01:43:58 Control Specifications: Control

Show Elements: All Elements Volume Units: ☐ IN ☒ ACRE-FT Sorting: Watershed Explorer

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
LECEF-1	0.0	15.8	1 January 2000, 06:05	2.4
TanagerEx1	0.0	1.7	1 January 2000, 06:10	0.5
TanagerEx4	0.0	0.4	1 January 2000, 06:05	0.1
TanagerEx3	0.0	0.4	1 January 2000, 06:05	0.1
TanagerEx2	0.0	0.3	1 January 2000, 06:05	0.1
SouthSwale	0.0	18.6	1 January 2000, 06:05	3.2
LECEF-2	0.0	10.6	1 January 2000, 06:05	1.6
EastSwale	0.1	28.0	1 January 2000, 06:05	4.8
PumpStation	0.1	27.9	1 January 2000, 06:05	4.8
Tank	0.1	3.6	1 January 2000, 11:30	2.0

PROPOSED CONDITION OUTPUT

Global Summary Results for Run "10-yr Storm"

Project: Tanager_LECEF_10yr Simulation Run: 10-yr Storm

Start of Run: 01Jan2000, 00:00 Basin Model: Tanager
End of Run: 02Jan2000, 00:00 Meteorologic Model: 10-yr, 24-hr Rainfall
Compute Time: 27Dec2024, 09:18:02 Control Specifications: Control

Show Elements: All Elements Volume Units: ☐ ... ☒ ACRE-FT Sorting: Watershed Explorer

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
TanagerProp	0.0	18.9	1 January 2000, 06:05	2.9
Tanager Basin	0.0	2.5	1 January 2000, 06:50	1.8
LECEF-1	0.0	16.5	1 January 2000, 06:05	2.5
SouthSwale	0.0	17.2	1 January 2000, 06:05	4.3
LECEF-2	0.0	11.2	1 January 2000, 06:05	1.7
EastSwale	0.1	27.4	1 January 2000, 06:05	6.0
PumpStation	0.1	27.4	1 January 2000, 06:05	6.0
Tank	0.1	4.5	1 January 2000, 09:20	3.2

HEC-HMS

100-YEAR, 24-HR RAINFALL STORM EVENT

SUMMARY OUTPUT

EXISTING CONDITION OUTPUT

Global Summary Results for Run "100-year, 24-hr"				
Project: 100yr_Tanager_LECEF_Exist Simulation Run: 100-year, 24-hr				
Start of Run: 01Jan2000, 00:00		Basin Model: Tanager		
End of Run: 02Jan2000, 00:00		Meteorologic Model: 100-yr, 24-hr Storm		
Compute Time: 27Dec2024, 03:54:21		Control Specifications: Control		
Show Elements:	All Elements	Volume Units:	☐ IN ☒ ACRE-FT	Sorting: Watershed Explorer
Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
LECEF-1	0.0	27.7	1 January 2000, 06:05	4.2
TanagerEx1	0.0	5.7	1 January 2000, 06:10	1.4
TanagerEx4	0.0	2.0	1 January 2000, 06:05	0.4
TanagerEx3	0.0	1.8	1 January 2000, 06:05	0.4
TanagerEx2	0.0	1.6	1 January 2000, 06:05	0.3
SouthSwale	0.0	27.3	1 January 2000, 06:10	6.8
LECEF-2	0.0	19.4	1 January 2000, 06:05	2.9
EastSwale	0.1	36.5	1 January 2000, 06:10	9.7
PumpStation	0.1	37.1	1 January 2000, 06:15	9.7
Tank	0.1	64.8	1 January 2000, 06:20	6.9

PROPOSED CONDITION OUTPUT

Global Summary Results for Run "100-yr Storm"				
Proje... Tanager_LECEF_10... Simulation R... 100-yr St...				
Start of R... 01Jan2000, 00...		Basin Mod... Tana...		
End of R... 02Jan2000, 00...		Meteorologic Mo... 100-yr, 24-hr Rai...		
Compute Ti... 27Dec2024, 03:5...		Control Specificati... Con...		
Show Eleme...	All Eleme...	Volume Un... ☐ IN ☒ ACRE-...	Sorti...	Watershed Expl... v
Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
TanagerProp	0.0	31.2	1 January 2000, 0...	4.7
Tanager Basin	0.0	11.1	1 January 2000, 0...	3.6
LECEF-1	0.0	27.7	1 January 2000, 0...	4.2
SouthSwale	0.0	23.7	1 January 2000, 0...	7.7
LECEF-2	0.0	19.4	1 January 2000, 0...	2.9
EastSwale	0.1	35.2	1 January 2000, 0...	10.6
PumpStation	0.1	35.2	1 January 2000, 0...	10.6
Tank	0.1	50.5	1 January 2000, 0...	7.8



NOAA Atlas 14, Volume 6, Version 2
Location name: San Jose, California, USA*
Latitude: 37.4242°, Longitude: -121.9318°
Elevation: 15 ft**

* source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.098 (0.087-0.111)	0.123 (0.109-0.139)	0.158 (0.140-0.179)	0.188 (0.165-0.216)	0.232 (0.194-0.280)	0.269 (0.218-0.334)	0.309 (0.242-0.397)	0.353 (0.266-0.472)	0.417 (0.297-0.591)	0.471 (0.321-0.699)
10-min	0.140 (0.125-0.159)	0.176 (0.157-0.200)	0.226 (0.201-0.257)	0.269 (0.236-0.310)	0.333 (0.278-0.402)	0.385 (0.313-0.479)	0.442 (0.347-0.570)	0.505 (0.381-0.676)	0.598 (0.426-0.847)	0.675 (0.460-1.00)
15-min	0.170 (0.152-0.192)	0.213 (0.190-0.241)	0.273 (0.243-0.311)	0.326 (0.286-0.375)	0.402 (0.337-0.486)	0.466 (0.378-0.580)	0.535 (0.420-0.689)	0.611 (0.461-0.818)	0.723 (0.515-1.02)	0.817 (0.556-1.21)
30-min	0.234 (0.209-0.265)	0.293 (0.262-0.333)	0.377 (0.334-0.429)	0.449 (0.394-0.517)	0.555 (0.464-0.670)	0.642 (0.522-0.799)	0.738 (0.579-0.949)	0.842 (0.636-1.13)	0.996 (0.711-1.41)	1.13 (0.766-1.67)
60-min	0.328 (0.293-0.371)	0.411 (0.366-0.466)	0.528 (0.468-0.600)	0.629 (0.552-0.724)	0.777 (0.650-0.938)	0.900 (0.731-1.12)	1.03 (0.811-1.33)	1.18 (0.891-1.58)	1.40 (0.996-1.98)	1.58 (1.07-2.34)
2-hr	0.482 (0.430-0.545)	0.598 (0.533-0.678)	0.763 (0.678-0.869)	0.907 (0.796-1.04)	1.12 (0.936-1.35)	1.29 (1.05-1.61)	1.48 (1.16-1.91)	1.69 (1.28-2.27)	2.00 (1.43-2.83)	2.26 (1.54-3.35)
3-hr	0.596 (0.532-0.675)	0.741 (0.660-0.840)	0.945 (0.839-1.08)	1.12 (0.985-1.29)	1.38 (1.16-1.67)	1.60 (1.30-1.99)	1.84 (1.44-2.36)	2.09 (1.58-2.80)	2.47 (1.76-3.50)	2.78 (1.90-4.13)
6-hr	0.815 (0.728-0.923)	1.02 (0.908-1.16)	1.30 (1.16-1.48)	1.55 (1.36-1.78)	1.91 (1.60-2.31)	2.21 (1.79-2.74)	2.52 (1.98-3.25)	2.87 (2.17-3.85)	3.38 (2.41-4.79)	3.80 (2.59-5.65)
12-hr	1.06 (0.947-1.20)	1.35 (1.20-1.53)	1.74 (1.55-1.98)	2.08 (1.82-2.40)	2.56 (2.14-3.10)	2.96 (2.40-3.68)	3.38 (2.65-4.35)	3.83 (2.89-5.12)	4.48 (3.19-6.34)	5.01 (3.41-7.44)
24-hr	1.32 (1.21-1.46)	1.70 (1.56-1.89)	2.22 (2.03-2.48)	2.66 (2.42-2.98)	3.28 (2.90-3.78)	3.77 (3.27-4.42)	4.28 (3.65-5.14)	4.84 (4.02-5.94)	5.62 (4.50-7.14)	6.24 (4.86-8.18)
2-day	1.63 (1.50-1.81)	2.11 (1.94-2.35)	2.75 (2.52-3.06)	3.28 (2.98-3.68)	4.01 (3.55-4.63)	4.59 (3.99-5.39)	5.20 (4.42-6.23)	5.83 (4.84-7.16)	6.71 (5.38-8.54)	7.41 (5.78-9.71)
3-day	1.83 (1.68-2.04)	2.36 (2.17-2.63)	3.07 (2.81-3.42)	3.65 (3.32-4.10)	4.45 (3.94-5.14)	5.08 (4.42-5.97)	5.73 (4.88-6.87)	6.41 (5.33-7.87)	7.34 (5.89-9.34)	8.09 (6.30-10.6)
4-day	2.02 (1.86-2.25)	2.60 (2.39-2.90)	3.37 (3.09-3.76)	4.00 (3.64-4.49)	4.87 (4.31-5.62)	5.55 (4.82-6.51)	6.24 (5.31-7.48)	6.97 (5.79-8.55)	7.96 (6.39-10.1)	8.75 (6.81-11.5)
7-day	2.53 (2.32-2.81)	3.23 (2.96-3.59)	4.15 (3.80-4.63)	4.91 (4.47-5.51)	5.95 (5.26-6.87)	6.76 (5.87-7.94)	7.59 (6.46-9.10)	8.45 (7.02-10.4)	9.62 (7.72-12.2)	10.5 (8.21-13.8)
10-day	2.82 (2.59-3.13)	3.58 (3.29-3.98)	4.59 (4.20-5.12)	5.42 (4.93-6.08)	6.56 (5.80-7.56)	7.43 (6.46-8.73)	8.32 (7.08-9.98)	9.25 (7.68-11.4)	10.5 (8.43-13.4)	11.5 (8.94-15.0)
20-day	3.70 (3.39-4.10)	4.71 (4.32-5.24)	6.02 (5.52-6.71)	7.09 (6.44-7.95)	8.52 (7.53-9.83)	9.60 (8.34-11.3)	10.7 (9.10-12.8)	11.8 (9.81-14.5)	13.3 (10.6-16.9)	14.4 (11.2-18.9)
30-day	4.44 (4.08-4.93)	5.66 (5.20-6.30)	7.24 (6.63-8.07)	8.49 (7.72-9.53)	10.2 (8.98-11.7)	11.4 (9.91-13.4)	12.6 (10.8-15.2)	13.9 (11.5-17.0)	15.5 (12.4-19.7)	16.7 (13.0-21.9)
45-day	5.46 (5.02-6.07)	6.97 (6.40-7.75)	8.88 (8.13-9.90)	10.4 (9.44-11.6)	12.3 (10.9-14.2)	13.8 (12.0-16.2)	15.2 (12.9-18.2)	16.6 (13.8-20.4)	18.4 (14.8-23.4)	19.7 (15.4-25.8)
60-day	6.58 (6.04-7.31)	8.38 (7.69-9.32)	10.6 (9.72-11.8)	12.4 (11.2-13.9)	14.6 (12.9-16.9)	16.3 (14.1-19.1)	17.9 (15.2-21.4)	19.4 (16.1-23.8)	21.4 (17.2-27.2)	22.8 (17.8-29.9)

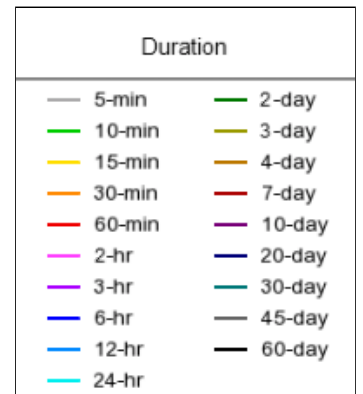
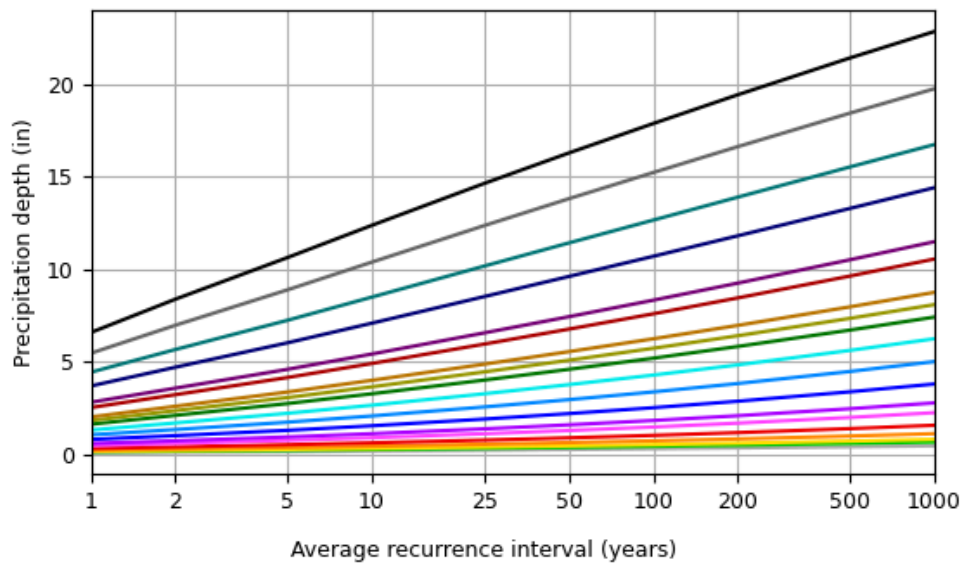
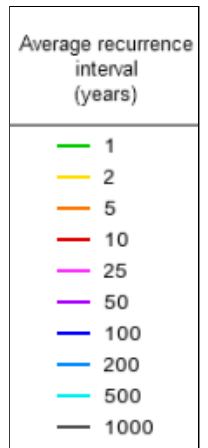
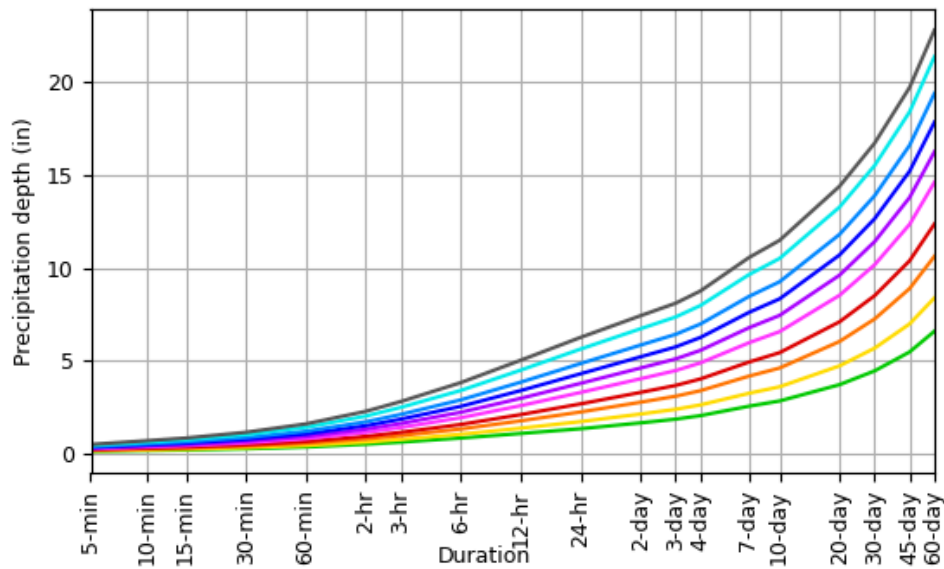
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 37.4242°, Longitude: -121.9318°



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Dec 24 17:46:16 2024

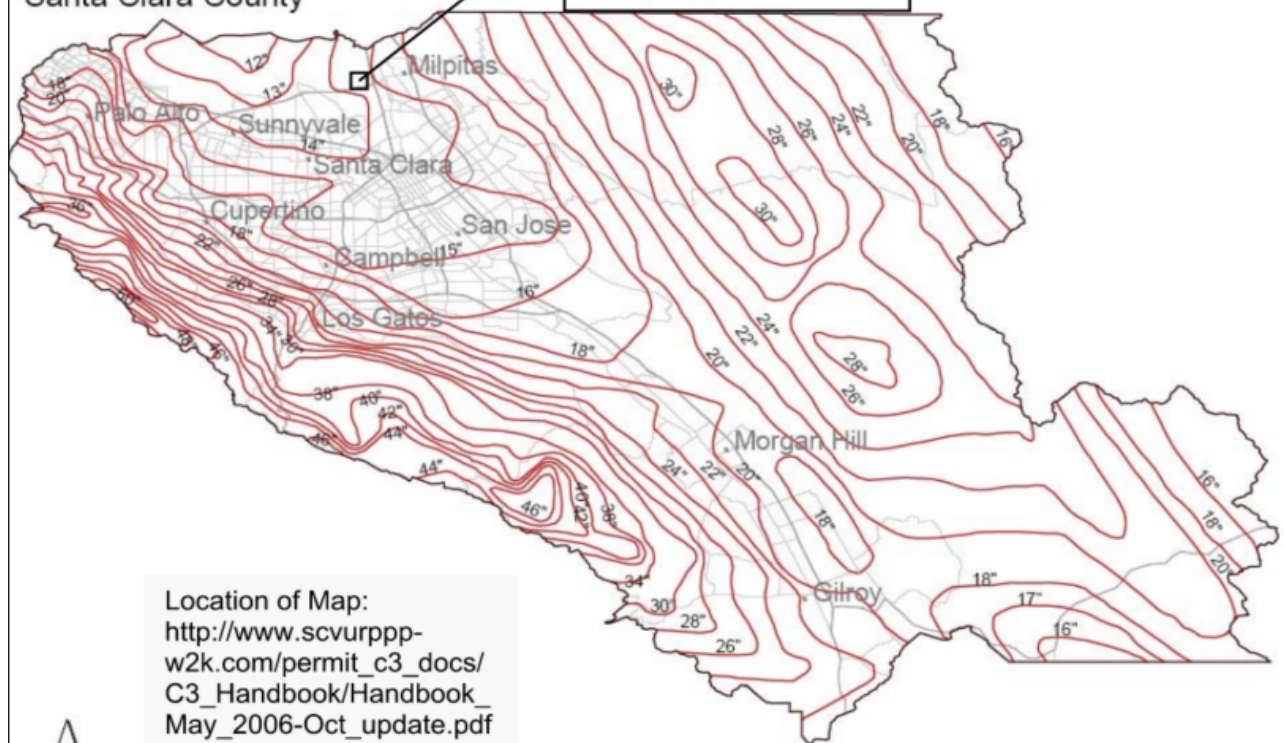
[Back to Top](#)**Maps & aerials****Small scale terrain**



Drainage Manual 2007
County of Santa Clara, California

Figure A-2
Mean Annual Precipitation Map
Santa Clara County

Approximate Project
Site Location



Location of Map:
http://www.scvrppp-w2k.com/permit_c3_docs/C3_Handbook/Handbook_May_2006-Oct_update.pdf

10 0 10 20 Miles

Table 3-1: Runoff Coefficients for Rational Formula

Land Use	C for Soil Type		
	B	C	D
Low Density Residential	0.30	0.40	0.45
Medium Density Residential	0.50	0.55	0.60
High Density Residential	0.70	0.70	0.75
Commercial	0.80	0.80	0.80
Industrial	0.70	0.75	0.75
Parks	0.20	0.30	0.35
Agricultural	0.15	0.35	0.40
Urban Open Space	0.10	0.35	0.45
Shrub Land	0.10	0.20	0.30
Paved / Impervious Surface	0.85	0.85	0.85

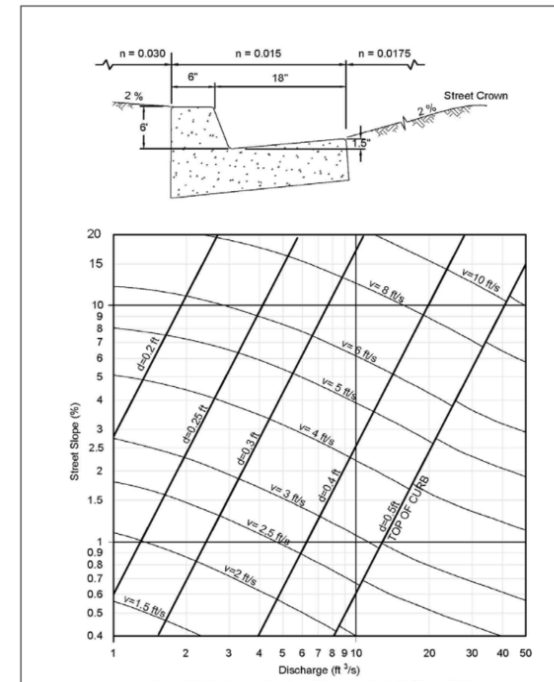


Figure 3-2: Gutter and Roadway Discharge-Velocity Chart (6" Curb)



Table E-1: Curve Numbers for AMC II

Land Use Type	Hydrologic Condition	Hydrologic Soil Group			
		A	B	C	D
Open Water (100% Impervious)	good fair poor				
Low Density Residential (25% Impervious)	good fair poor	35 44 64	48 58 68	66 71 78	70 74 79
High Density Residential (50% Impervious)	good fair poor	35 44 64	48 58 68	65 71 78	70 74 79
Commercial/Industrial (80% Impervious)	good fair poor	35 44 64	48 58 68	65 71 78	70 74 79
Bare Rock/Sand/Clay (Imperviousness Varies)					
Quarries/Gravel Pits (0 % Impervious)	good fair poor	0 0 0	0 0 0	0 0 0	0 0 0
Deciduous Forest (0% Impervious)	good fair poor	27 35 48	30 48 66	41 57 74	48 63 79
Evergreen Forest (0% Impervious)	good fair poor	37 45 58	43 57 71	62 69 85	70 80 90
Mixed Forest	good fair poor	32 40 53	36 52 68	51 63 80	59 72 85
Shrub Land (0% Impervious)	good fair poor	27 35 48	43 51 62	60 65 72	68 72 78
Orchards (1% Impervious)	good fair poor	39 43 57	52 65 73	66 76 82	71 82 86
Vineyards (1% Impervious)	good fair poor	64 67 71	70 75 80	77 82 87	80 85 90
Grassland (0% Impervious)	good fair poor	38 48 58	50 60 70	69 74 80	76 80 84
Pasture/Hay (0% Impervious)	good fair poor	34 44 64	50 60 70	69 74 80	76 80 84
Row Crops (1% Impervious)	good fair poor	64 67 71	70 75 80	77 82 87	80 85 90
Small Grains (0% Impervious)	good fair poor	48 49 50	58 59 60	70 71 71	74 75 75
Fallow (1% Impervious)	good fair poor	64 70 77	68 77 86	78 84 91	79 86 94
Urban Recreational (10% Impervious)	good fair poor	34 44 64	48 58 64	66 71 78	70 74 79

Table E-2: Conversion of AMC II Curve Numbers to Other AMC Values

AMC II	AMC I	AMC III	AMC II-1/4	AMC II-1/2	AMC II	AMC I	AMC III	AMC II-1/4	AMC II-1/2
100	100	100	100	100	61	41	78	65.5	70
99	97	100	99.5	100	60	40	78	64.5	69
98	94	99	98.5	99	59	39	77	63.5	68
97	91	99	97.5	98	58	38	76	62.5	67
96	89	99	97	98	57	37	75	61.5	66
95	87	98	96	97	56	36	75	61	66
94	85	98	95	96	55	35	74	60	65
93	83	98	94.5	96	54	34	73	59	64
92	81	97	93.5	95	53	33	72	58	63
91	80	97	92.5	94	52	32	71	57	62
90	78	96	91.5	93	51	31	70	56	61
89	76	96	91	93	50	31	70	55	60
88	75	95	90	92	49	30	69	54	59
87	73	95	89	91	48	29	68	53	58
86	72	94	88	90	47	28	67	52	57
85	70	94	87.5	90	46	27	66	51	56
84	68	93	86.5	89	45	26	65	50	55
83	67	93	85.5	88	44	25	64	49	54
82	66	92	84.5	87	43	25	63	48	53
81	64	92	84	87	42	24	62	47	52
80	63	91	83	86	41	23	61	46	51
79	62	91	82	85	40	22	60	45	50
78	60	90	81	84	39	21	59	44	49
77	59	89	80	83	38	21	58	43	48
76	58	89	79.5	83	37	20	57	42	47
75	57	88	78.5	82	36	19	56	41	46
74	55	88	77.5	81	35	18	55	40	45
73	54	87	76.5	80	34	18	54	39	44
72	53	86	75.5	79	33	17	53	38	43
71	52	86	75	79	32	16	52	37	42
70	51	85	74	78	31	16	51	36	41
69	50	84	73	77	30	15	50	35	40
68	48	84	72	76	25	12	43	29.5	34
67	47	83	71	75	20	9	37	24.5	29
66	46	82	70	74	15	6	30	19	23
65	45	82	69.5	74	10	4	22	13	16
64	44	81	68.5	73	5	2	13	7	9
63	43	80	67.5	72	0	0	0	0	0

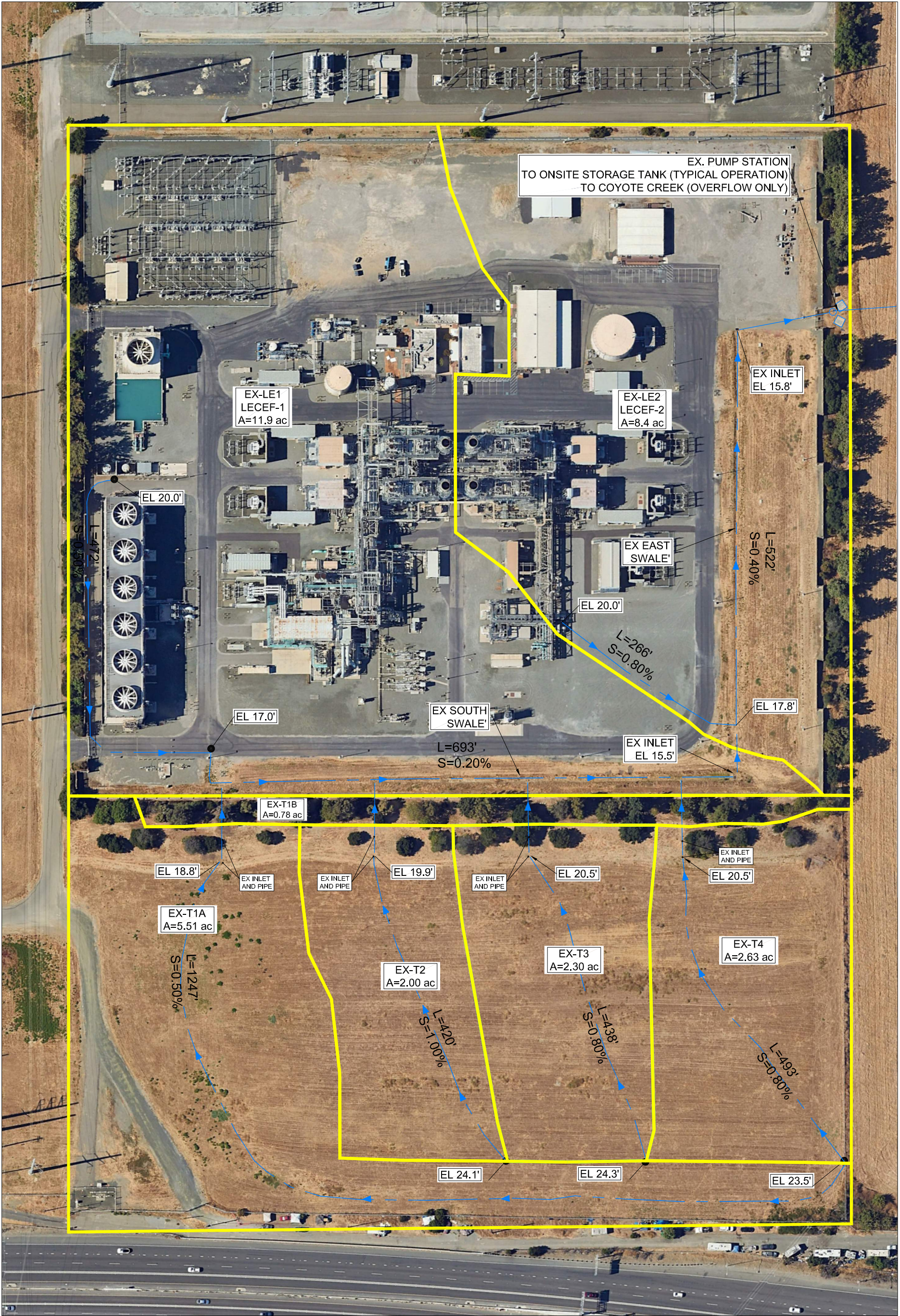
Table B-1: Parameters $A_{T,D}$ and $B_{T,D}$ for TDS Equation

2-YR RETURN PERIOD		
5-min	0.120194	0.001385
10-min	0.166507	0.001956
15-min	0.176618	0.003181
30-min	0.212497	0.005950
1-hr	0.253885	0.010792
2-hr	0.330848	0.019418
3-hr	0.374053	0.027327
6-hr	0.425178	0.045735
12-hr	0.409397	0.069267
24-hr	0.314185	0.096343
48-hr	0.444080	0.134537
72-hr	0.447104	0.159461
5-YR RETURN PERIOD		
5-min	0.170347	0.001857
10-min	0.228482	0.002758
15-min	0.250029	0.004036
30-min	0.307588	0.007082
1-hr	0.357109	0.013400
2-hr	0.451840	0.024242
3-hr	0.512583	0.034359
6-hr	0.554937	0.060859
12-hr	0.562227	0.094871
24-hr	0.474528	0.136056
48-hr	0.692427	0.187173
72-hr	0.673277	0.224003
10-YR RETURN PERIOD		
5-min	0.201876	0.002063
10-min	0.258682	0.003569
15-min	0.294808	0.004710
30-min	0.367861	0.007879
1-hr	0.427723	0.014802
2-hr	0.522608	0.027457
3-hr	0.591660	0.038944
6-hr	0.625054	0.070715
12-hr	0.641638	0.111660
24-hr	0.567017	0.162550
48-hr	0.832445	0.221820
72-hr	0.810509	0.265469

Table B-2: Parameters $A_{T,D}$ and $B_{T,D}$ for TDS Equation

Return Period/Duration	$A_{T,D}$	$B_{T,D}$
25-YR RETURN PERIOD		
5-min	0.230641	0.002691
10-min	0.287566	0.004930
15-min	0.348021	0.005594
30-min	0.443761	0.008719
1-hr	0.508791	0.016680
2-hr	0.612629	0.031025
3-hr	0.689252	0.044264
6-hr	0.693566	0.083195
12-hr	0.725892	0.132326
24-hr	0.675008	0.195496
48-hr	0.989588	0.264703
72-hr	0.967854	0.316424
50-YR RETURN PERIOD		
5-min	0.249324	0.003241
10-min	0.300971	0.006161
15-min	0.384016	0.006315
30-min	0.496301	0.009417
1-hr	0.568345	0.017953
2-hr	0.672662	0.033694
3-hr	0.754661	0.048157
6-hr	0.740666	0.092105
12-hr	0.779967	0.147303
24-hr	0.747121	0.219673
48-hr	1.108358	0.295510
72-hr	1.075643	0.353143
100-YR RETURN PERIOD		
5-min	0.269993	0.003580
10-min	0.315263	0.007312
15-min	0.421360	0.006957
30-min	0.553934	0.009857
1-hr	0.626608	0.019201
2-hr	0.732944	0.036193
3-hr	0.816471	0.051981
6-hr	0.776677	0.101053
12-hr	0.821859	0.162184
24-hr	0.814046	0.243391
48-hr	1.210895	0.325943
72-hr	1.175000	0.389038

APPENDIX B
HYDROLOGY EXHIBITS
AND
TOPOGRAPHY



NV5

15092 AVENUE OF SCIENCE, SUITE 200
SAN DIEGO, CA 92128
P: 858.385.0500 WWW.NV5.COM

0 60 120 Feet



TANAGER ENERGY STORAGE FACILITY EXISTING CONDITIONS HYDROLOGY

PREPARED FOR: CALPINE CORP.

DATE SUBMITTED: 12/27/24

SHEET NUMBER

1

OF 1 SHEETS

JOB NUMBER

24-0001625



NV5

15092 AVENUE OF SCIENCE, SUITE 200
SAN DIEGO, CA 92128
P: 858.385.0500 WWW.NV5.COM

TANAGER ENERGY STORAGE FACILITY PROPOSED CONDITIONS HYDROLOGY

PREPARED FOR: CALPINE CORPORATION

DATE SUBMITTED: 12/27/24

SHEET NUMBER

1

OF 1 SHEETS

JOB NUMBER
24-0001625



VICINITY MAP

N.T.S.

SURVEYOR'S STATEMENT

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT AT THE REQUEST OF JOHN WARREN, LAND MANAGER, CALPINE, INC. IN DECEMBER OF 2024.

MICHAEL E. MILANI
L.S. NO. 5311, EXP. 12/31/2025

BASIS OF BEARINGS:

THE BASIS OF BEARINGS FOR THIS PROJECT ARE TWO FOUND 1/2" REBAR & CAP PROPERTY CORNERS ALONG THE EAST PROPERTY LINE AS SHOWN ON THE RECORD OF SURVEY ENTITLED, "WEST LINE OF COYOTE CREEK (DOC. 11704958), ADJOINING LANDS OF SMITH, OLKER, ET AL (DOC. 8052228)", FILED APRIL 19, 2005 IN BOOK 784 OF MAPS AT PAGES 8-9, SANTA CLARA COUNTY RECORDS. BEARING TAKEN AS NORTH 14° 31' 34" WEST.

BASIS OF ELEVATION:

THE BASIS OF ELEVATIONS FOR THIS PROJECT IS ASSUMED AT A SET MAG NAIL, APPROXIMATELY 72 FEET NORTH OF THE CONCRETE WALL ALONG THE NORTH SIDE OF THE FIELD SHOWN ON THIS SHEET, AT A CENTRAL INTERSECTION OF PAVED ROADS, BEING CONTROL POINT AND FLIGHT CROSS NUMBER #204. ELEVATION ASSUMED AS 18.385 FEET.

SURVEY NOTES:

1. FIELD WORK WAS PERFORMED IN JANUARY AND APRIL, 2024.
2. A CONDITION OF TITLE GUARANTEE WAS PROVIDED.
3. ORTHOGRAPHIC AERIAL PHOTOGRAPHY TAKEN IN JANUARY, 2024.

LEGAL DESCRIPTION:

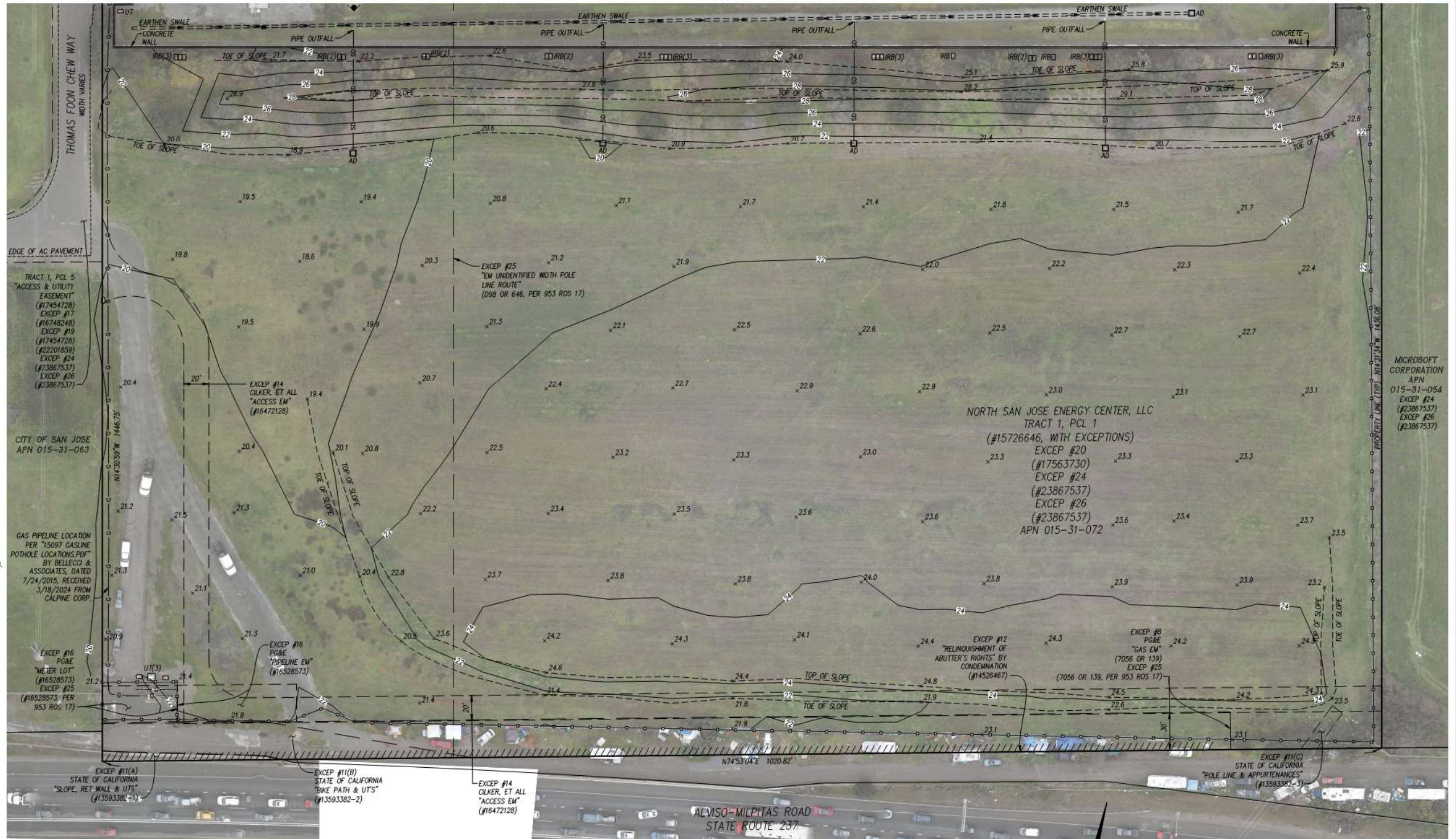
A PORTION OF THE GRANT DEED TO NORTH SAN JOSE ENERGY CENTER, LLC, RECORDED JUNE 15, 2001 AS DOCUMENT #15726646, SANTA CLARA COUNTY RECORDS, ALONG WITH A PORTION OF THE ACCESS ROAD AND UTILITY EASEMENT AGREEMENT, RECORDED NOVEMBER 3, 2003, AS DOCUMENT #17454728, SANTA CLARA COUNTY RECORDS.

LEGEND

- FENCE
- FIRE HYDRANT
- GASLINE
- RELINQUISHMENT OF ABUTTER'S RIGHTS
- SD — STORM DRAIN PIPE

ABBREVIATIONS

- AC ASPHALTIC CONCRETE
- AD AREA DRAIN
- EM EASEMENT
- EXCEP EXCEPTION
- EVAE EMERGENCY VEHICLE ACCESS EASEMENT
- IRB IRRIGATION BOX
- PCL PARCEL
- PTR PRELIMINARY TITLE REPORT
- TYP TYPICAL
- UT UTILITY BOX



Storm Water Monitoring & Reporting
Land Development Engineering
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Construction Staking



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Fax: (925) 674-9279
Web: www.milaniassociates.com

PARTIAL BOUNDARY & TOPOGRAPHIC SURVEY

810 THOMAS FOON CHEW WAY

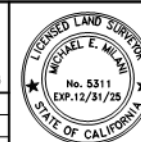
CITY OF SAN JOSE

SANTA CLARA COUNTY

CALIFORNIA

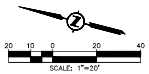
DESIGNED UNDER THE DIRECTION OF:

MICHAEL E. MILANI
DATE
L.S. No. 5311 REGISTRATION EXPIRES 12/31/25
DESIGN: N/A
JOB NO. 3167
DRAWN: JMG
DATE: MAY 2024
CHECKED: KRA / SJAG
SCALE: AS SHOWN



NO.	REVISIONS	BY	APP	DATE	SHEET
1					1
OF					SHEETS





CITY OF SAN JOSE APR 018-31-068		CITY OF SAN JOSE APR 018-31-072		ALTA SITE - SOUTHWEST SANTA CLARA COUNTY		CALIFORNIA		Client: Water Monitoring & Reporting Contract: 100-1000 Project: 100-1000 Drawing: 100-1000 Scale: 1"=30' Date: 04/18/18 Author: [Redacted] Checker: [Redacted] Engineer: [Redacted]		2025 Steward Drive, Suite 100 Cupertino, CA 95014 Phone: (408) 674-8278 Web: www.milani.com		MILANI Engineering & Architecture		100-1000-001 100-1000-002 100-1000-003 100-1000-004 100-1000-005 100-1000-006 100-1000-007 100-1000-008 100-1000-009 100-1000-010 100-1000-011 100-1000-012 100-1000-013 100-1000-014 100-1000-015 100-1000-016 100-1000-017 100-1000-018 100-1000-019 100-1000-020 100-1000-021 100-1000-022 100-1000-023 100-1000-024 100-1000-025 100-1000-026 100-1000-027 100-1000-028 100-1000-029 100-1000-030 100-1000-031 100-1000-032 100-1000-033 100-1000-034 100-1000-035 100-1000-036 100-1000-037 100-1000-038 100-1000-039 100-1000-040 100-1000-041 100-1000-042 100-1000-043 100-1000-044 100-1000-045 100-1000-046 100-1000-047 100-1000-048 100-1000-049 100-1000-050 100-1000-051 100-1000-052 100-1000-053 100-1000-054 100-1000-055 100-1000-056 100-1000-057 100-1000-058 100-1000-059 100-1000-060 100-1000-061 100-1000-062 100-1000-063 100-1000-064 100-1000-065 100-1000-066 100-1000-067 100-1000-068 100-1000-069 100-1000-070 100-1000-071 100-1000-072 100-1000-073 100-1000-074 100-1000-075 100-1000-076 100-1000-077 100-1000-078 100-1000-079 100-1000-080 100-1000-081 100-1000-082 100-1000-083 100-1000-084 100-1000-085 100-1000-086 100-1000-087 100-1000-088 100-1000-089 100-1000-090 100-1000-091 100-1000-092 100-1000-093 100-1000-094 100-1000-095 100-1000-096 100-1000-097 100-1000-098 100-1000-099 100-1000-100	
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