

Map Legend

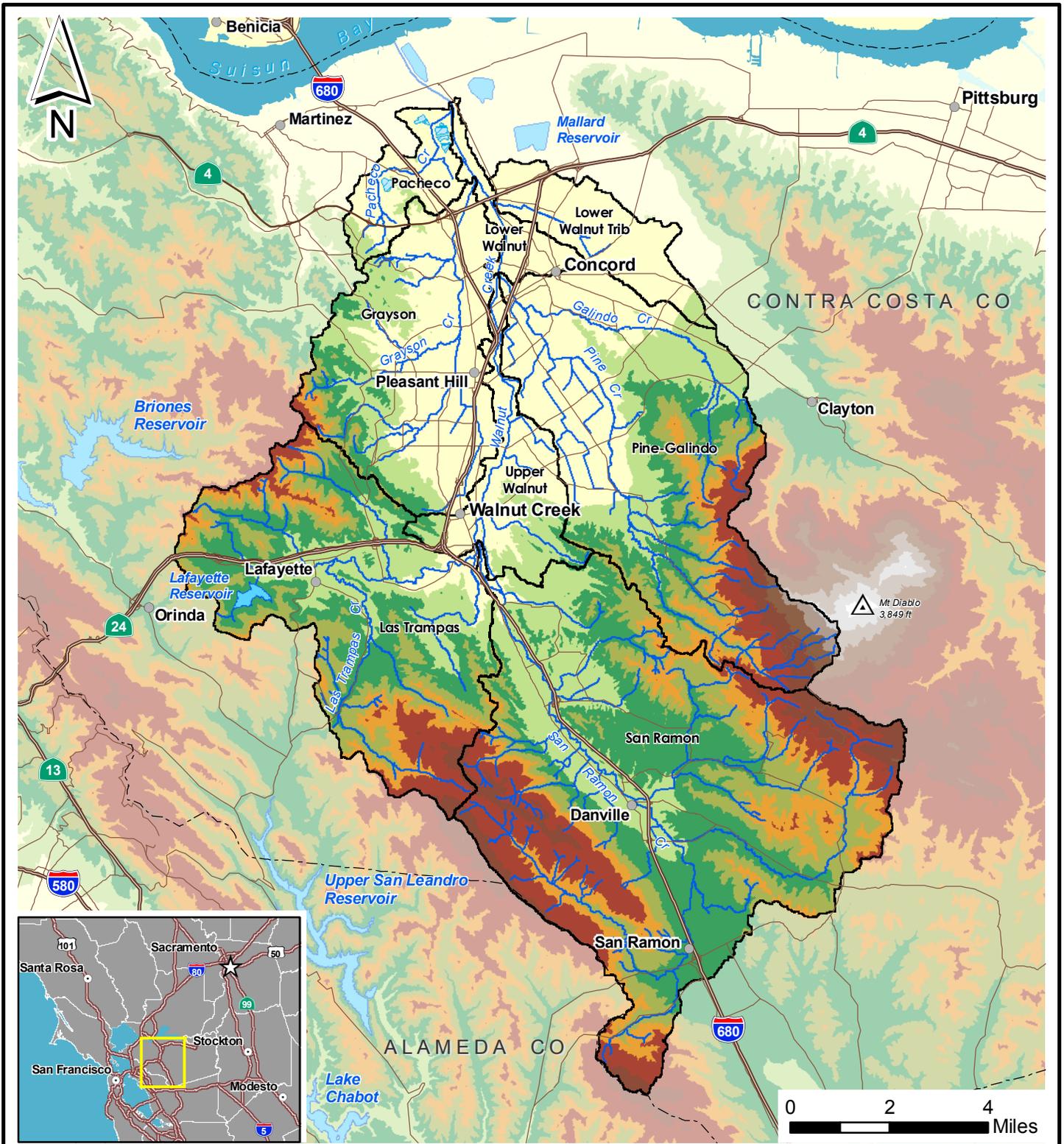
- | | |
|-----------------|------------|
| Subbasin | Freeway |
| Water Body | Highway |
| Stream | Major Road |
| County Boundary | City |

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

General Map

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**

Prepared by J.S.M



Map Legend

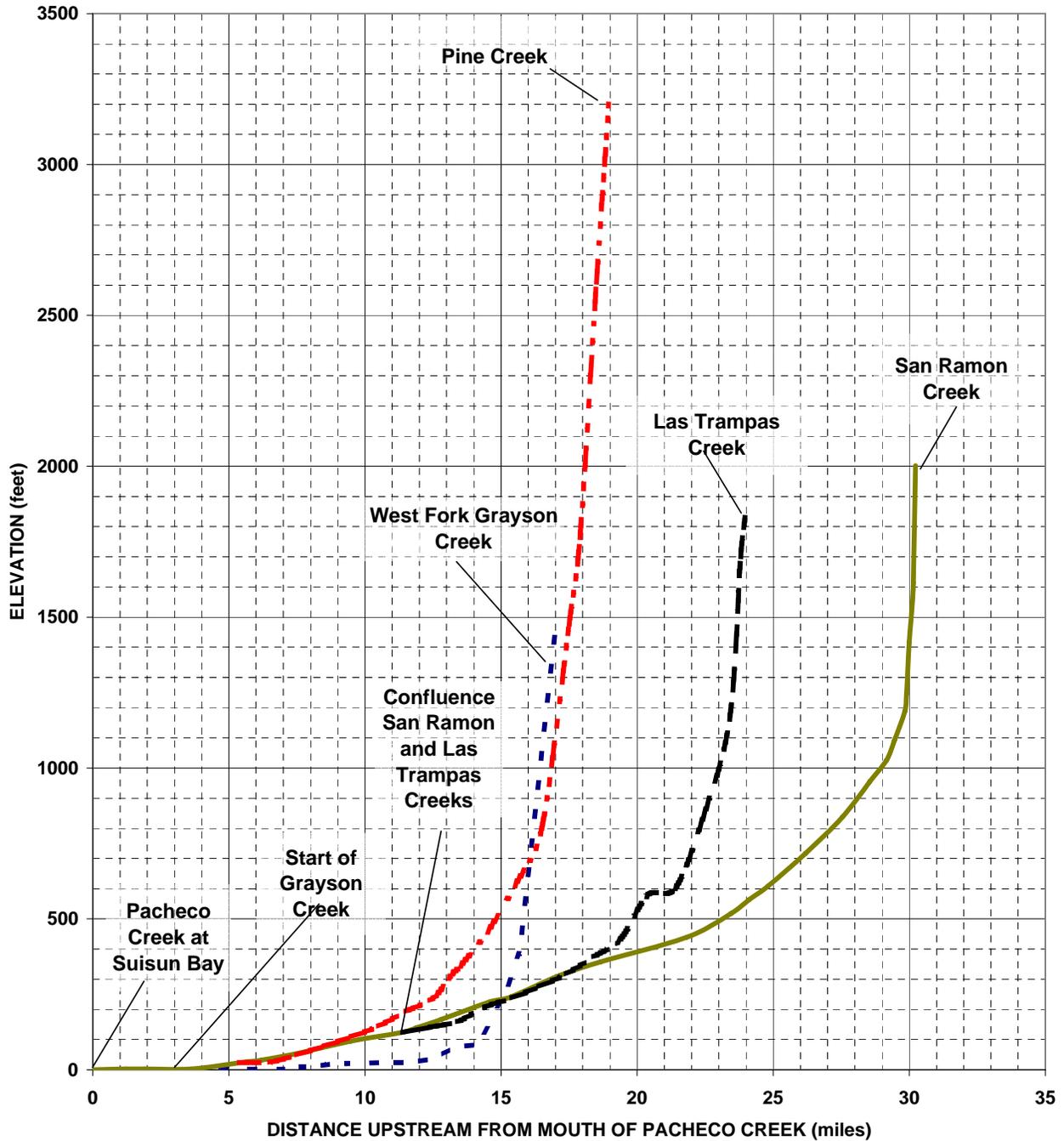
- Subbasin
 - Water Body
 - Stream
 - County Boundary
 - Freeway
 - Highway
 - Major Road
 - City
- | | |
|--------------------|-------------|
| Elevation in Feet: | |
| Below Sea Level | 1000 - 1500 |
| 0 - 200 | 1500 - 2000 |
| 200 - 400 | 2000 - 2500 |
| 400 - 600 | 2500 - 3000 |
| 600 - 800 | 3000 - 3500 |
| 800 - 1000 | Above 3500 |

Prepared by J.S.M

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

Topographic Map

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**



Distance and elevation measurements:
Terrain Navigator Pro Version 6.01. 2003

San Ramon Creek profile is the solid line.

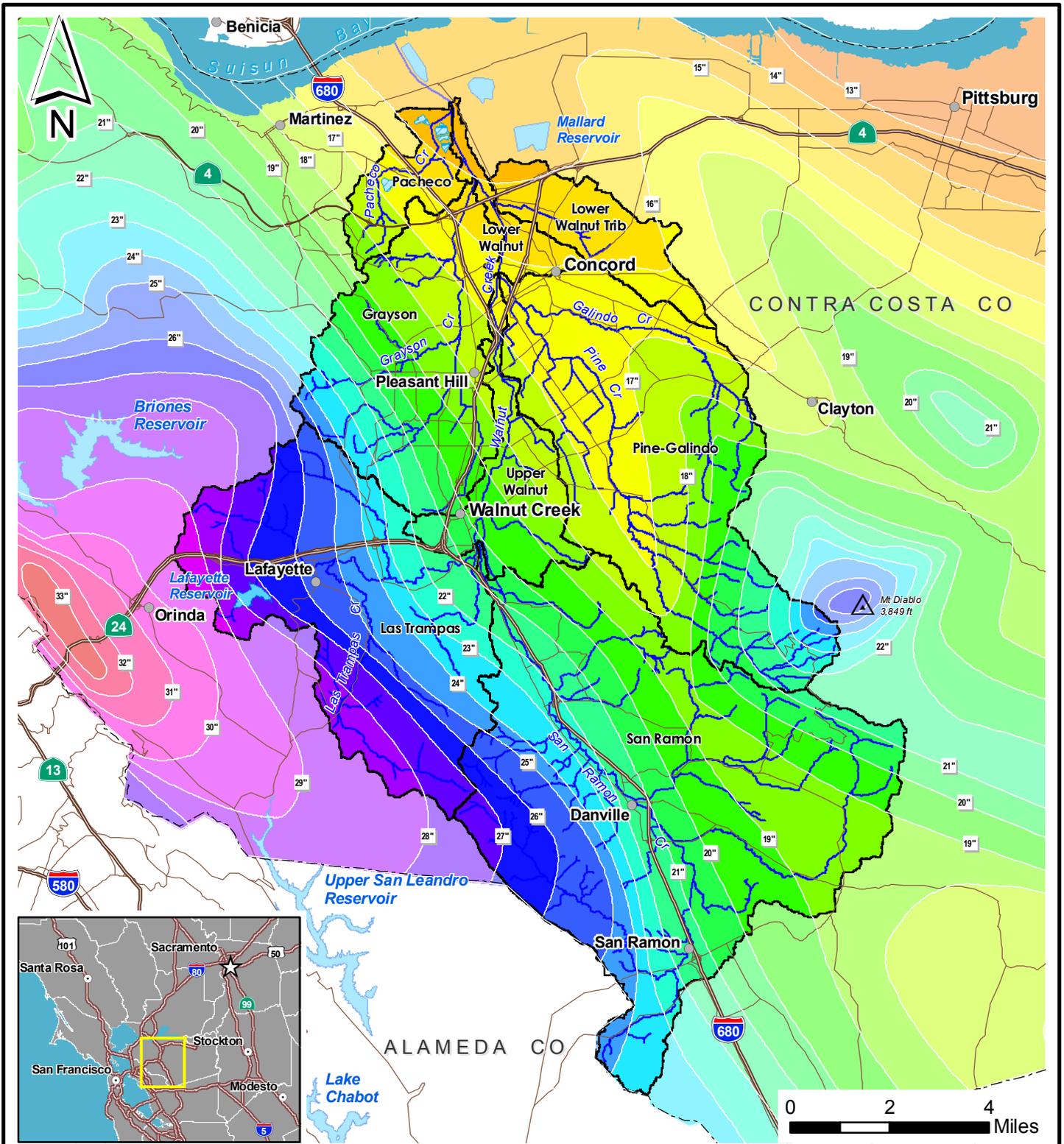
Dashed lines go up WF Grayson Creek,
Pine Creek, and Las Trampas Creek.

Developed and prepared by JLE

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

Walnut Creek Tributaries Stream Profiles

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT



Map Legend

- Subbasin
 - Water Body
 - Stream
 - County Boundary
 - Freeway
 - Highway
 - Major Road
 - City
- | Precipitation in Inches: | | |
|--------------------------|---------|---------|
| 12 - 13 | 20 - 21 | 27 - 28 |
| 13 - 14 | 21 - 22 | 28 - 29 |
| 14 - 15 | 22 - 23 | 29 - 30 |
| 15 - 16 | 23 - 24 | 30 - 31 |
| 16 - 17 | 24 - 25 | 31 - 32 |
| 17 - 18 | 25 - 26 | 32 - 33 |
| 18 - 19 | 26 - 27 | 33 - 34 |
| 19 - 20 | | |

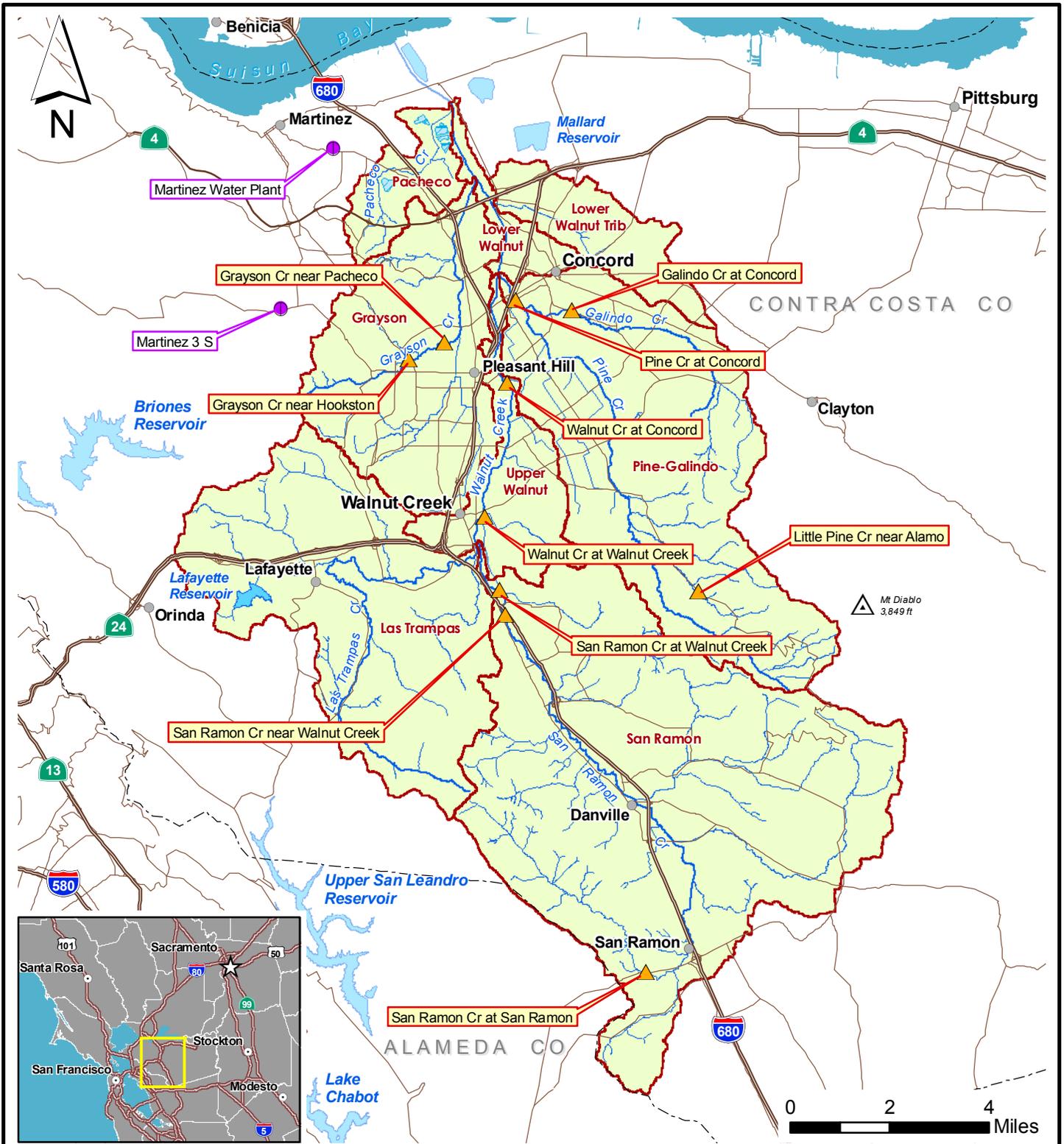
*Precipitation data provided by Contra Costa County

Prepared by J.S.M

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

Mean Seasonal Precipitation

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**



Map Legend

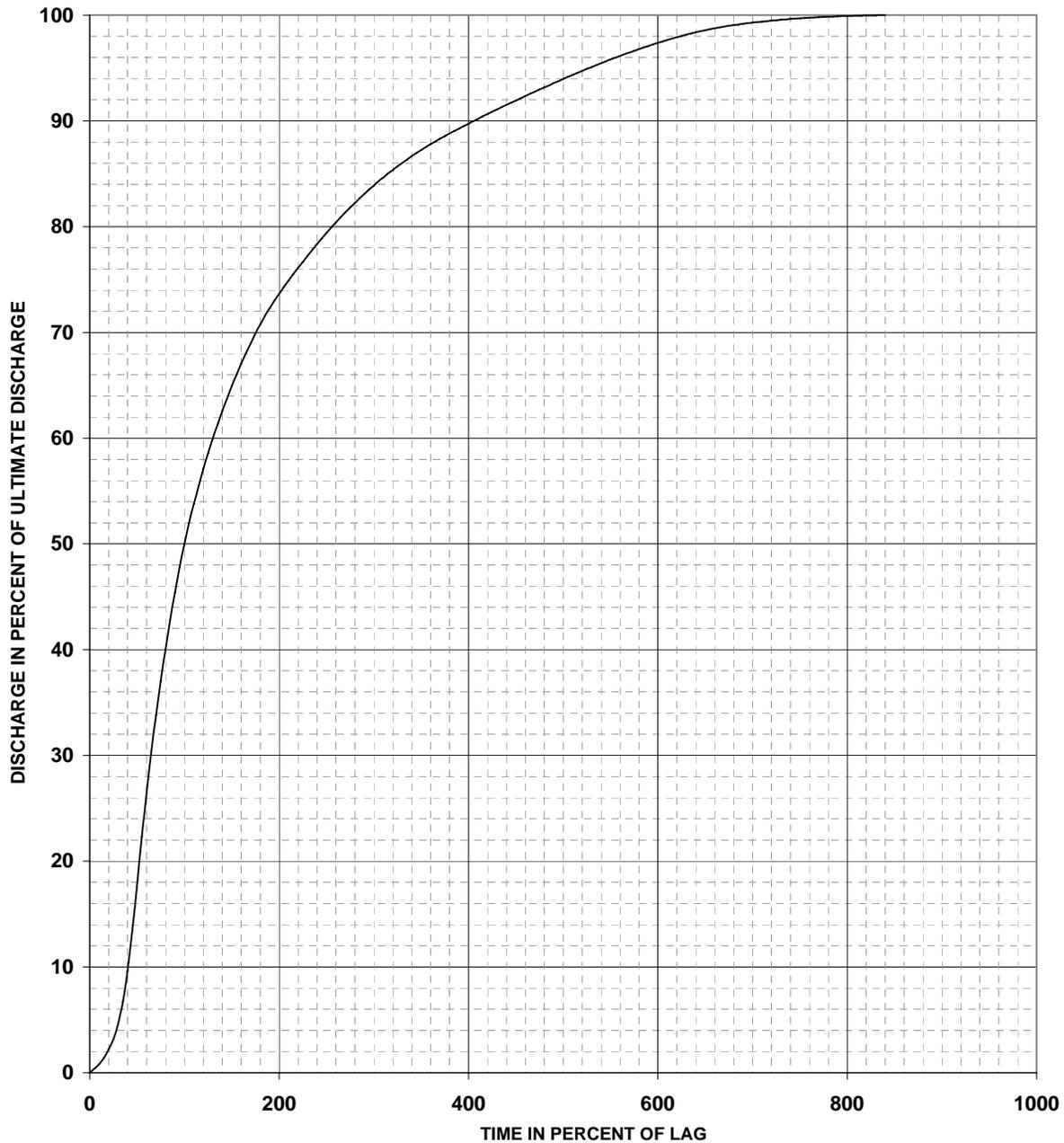
- | | |
|--------------------|-----------------|
| Subbasin | Freeway |
| Water Body | Highway |
| Stream | Major Road |
| Stream Gage | County Boundary |
| Precipitation Gage | City |

Prepared by J.S.M

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

**Stream Gage and
Precipitation Station Sites**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT



— Walnut Creek Mtn "S" Curve (840%)

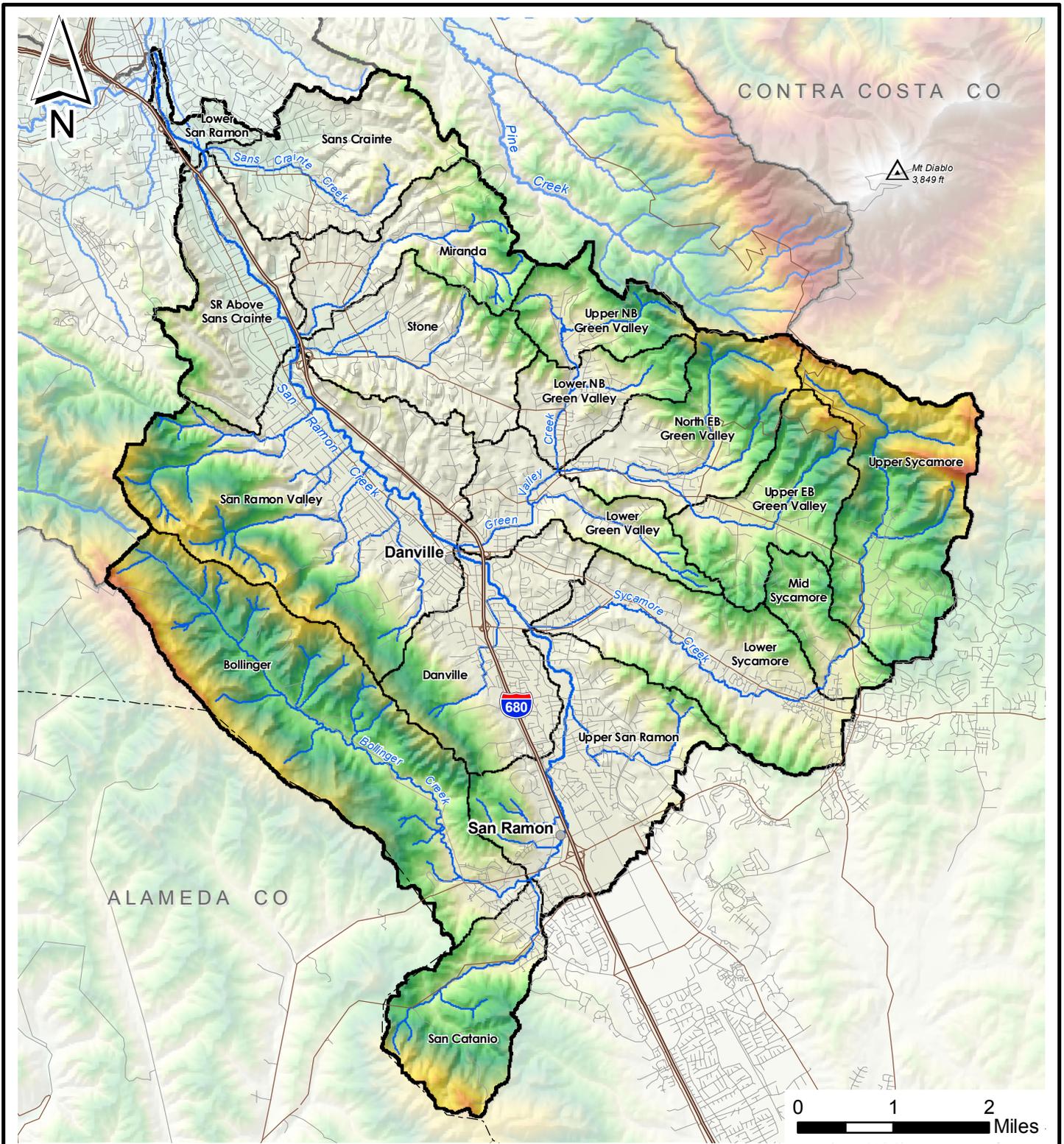
From: Feasibility Study Hydrology, Walnut Creek Basin Interim Office Report, 1992, U.S. Army Corps of Engineers, Sacramento District

Prepared by JLB

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**Walnut Creek Mountain
"S" Curve**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT



Map Legend

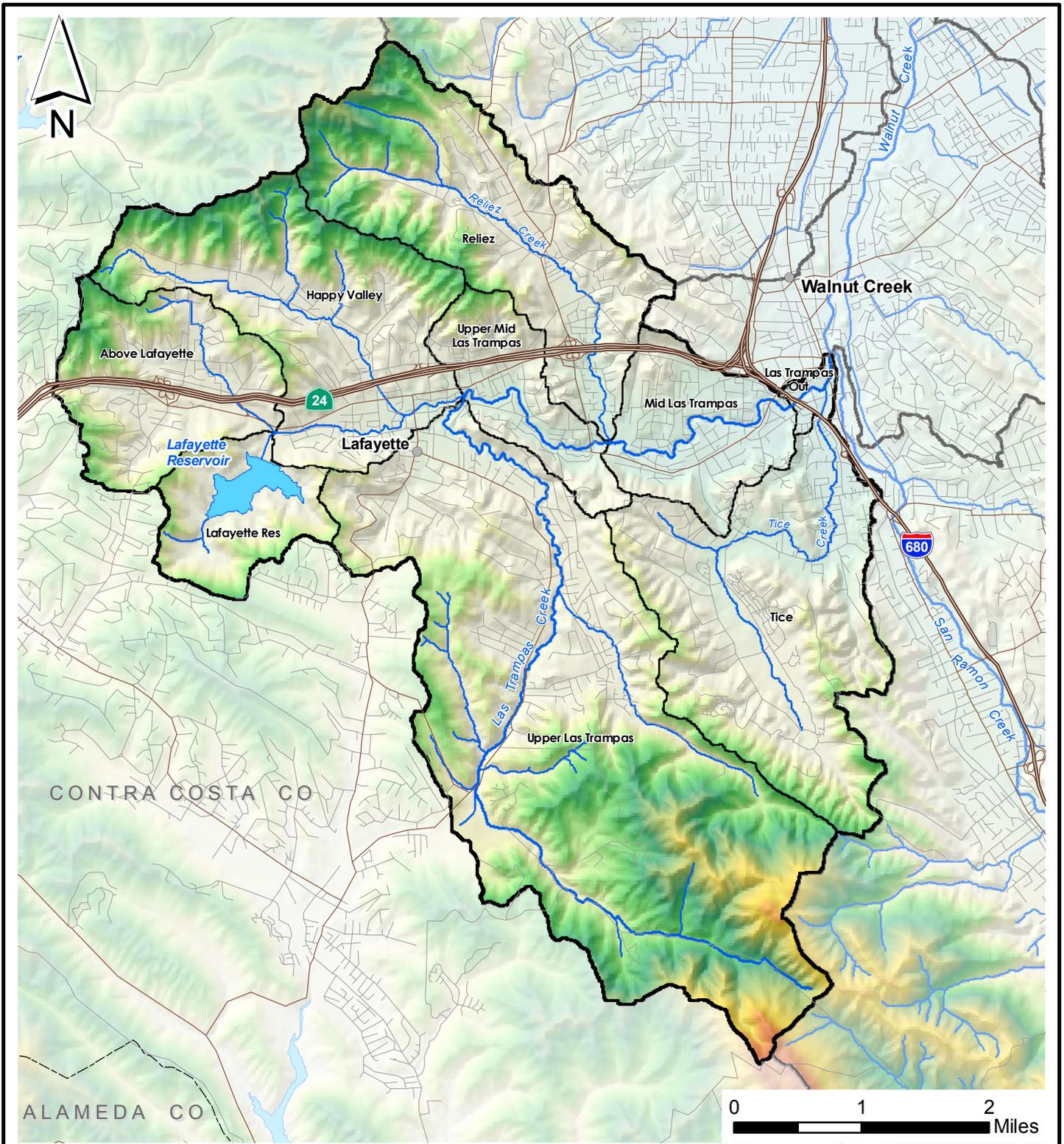
- | | |
|----------------------|----------------|
| Subbasin | Freeway |
| Delineation Boundary | Highway |
| Stream | Major Road |
| County Boundary | Road or Street |
| | City |

Prepared by J.S.M

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

San Ramon Subbasin

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**



ALAMEDA CO

CONTRA COSTA CO

Map Legend

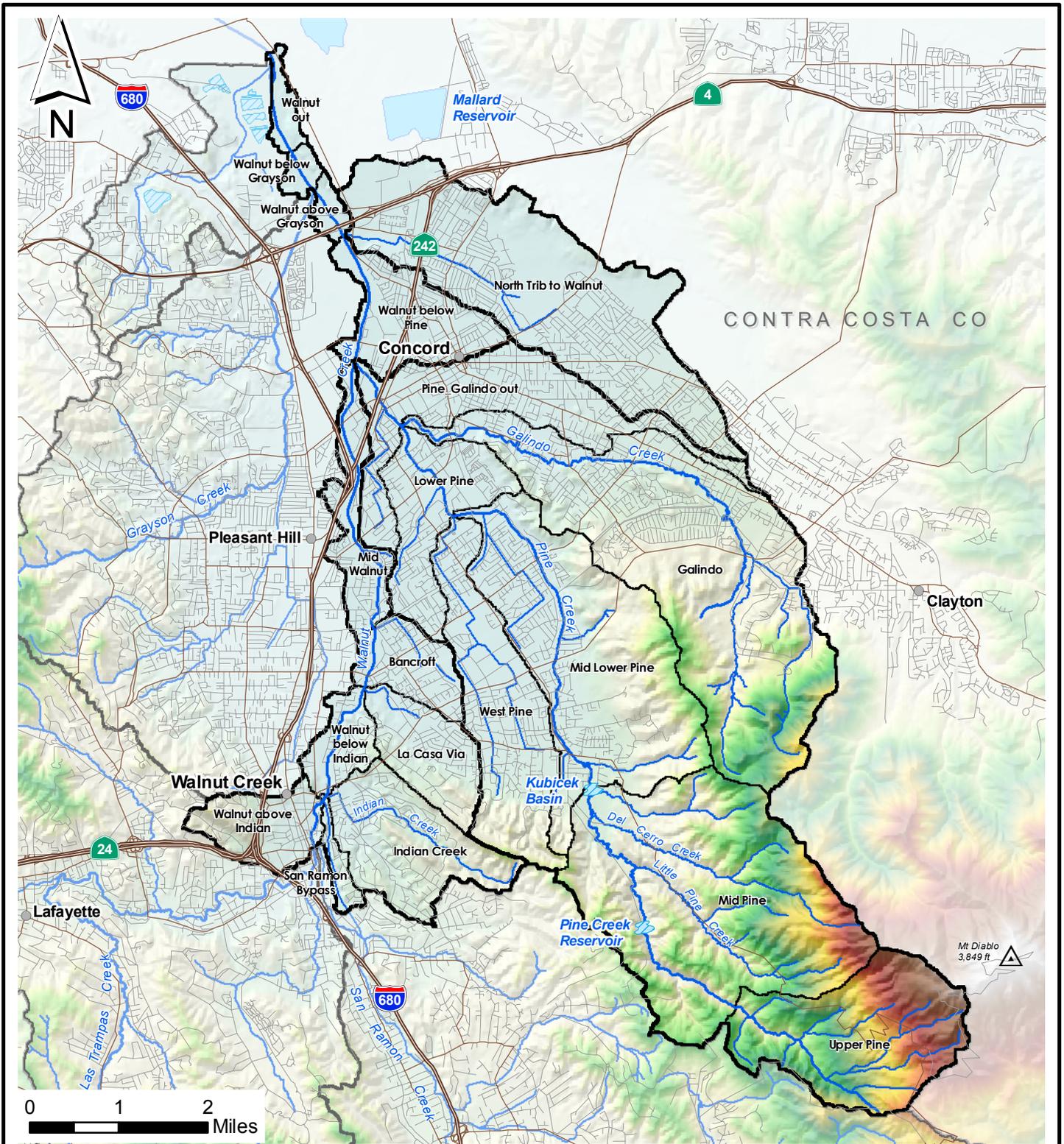
- | | |
|-------------------|----------------|
| Drainage Boundary | Freeway |
| Subbasin Boundary | Highway |
| Water Body | Major Road |
| Stream | Road or Street |
| County Boundary | City |

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

Las Trampas Subbasin

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**

Prepared by J.S.M



Map Legend

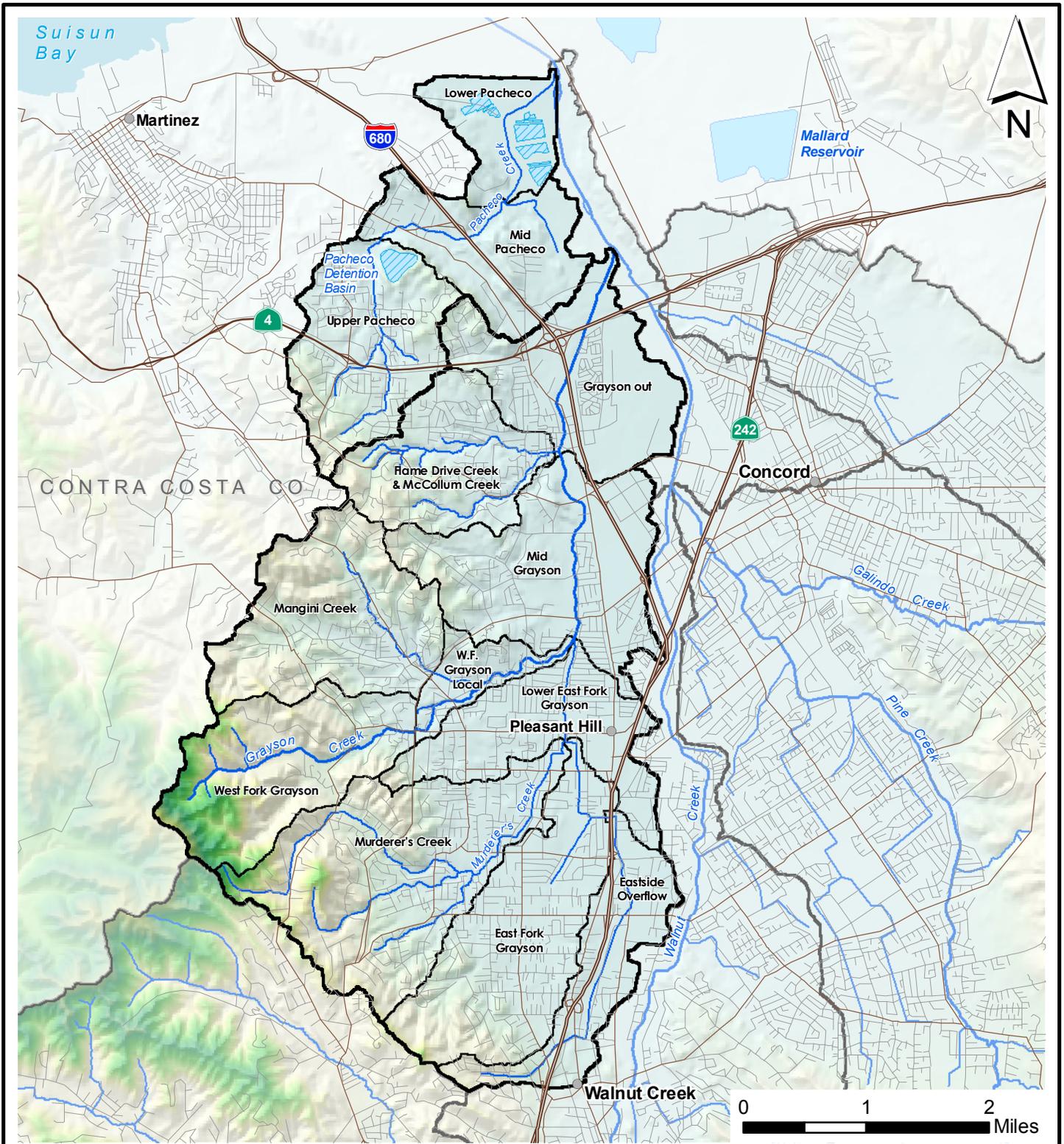
- | | |
|-------------------|----------------|
| Drainage Boundary | Freeway |
| Subbasin Boundary | Highway |
| Lake or Reservoir | Major Road |
| Detention Basin | Road or Street |
| Stream | City |

Prepared by J.S.M

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

**Pine-Galindo, Upper Walnut,
Lower Walnut, and
Lower Walnut Trib Subbasins**

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**



Map Legend

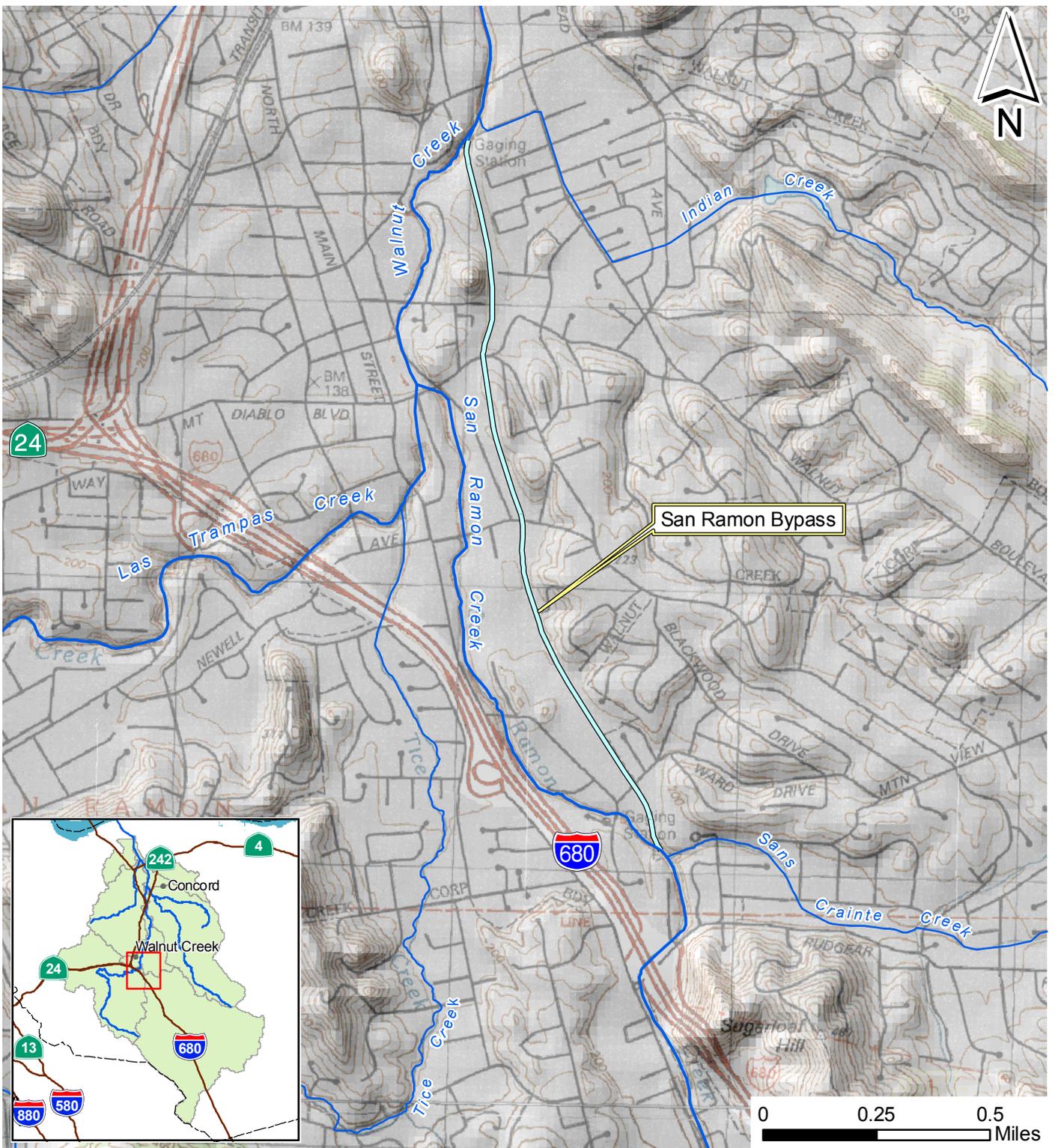
- | | | | |
|--|----------------------|--|----------------|
| | Subbasin | | Freeway |
| | Delineation Boundary | | Highway |
| | Lake or Reservoir | | Major Road |
| | Detention Basin | | Road or Street |
| | Stream | | City |

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

Pacheco and Grayson Subbasins

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**

Prepared by J.S.M



Map Legend

 Stream  Bypass

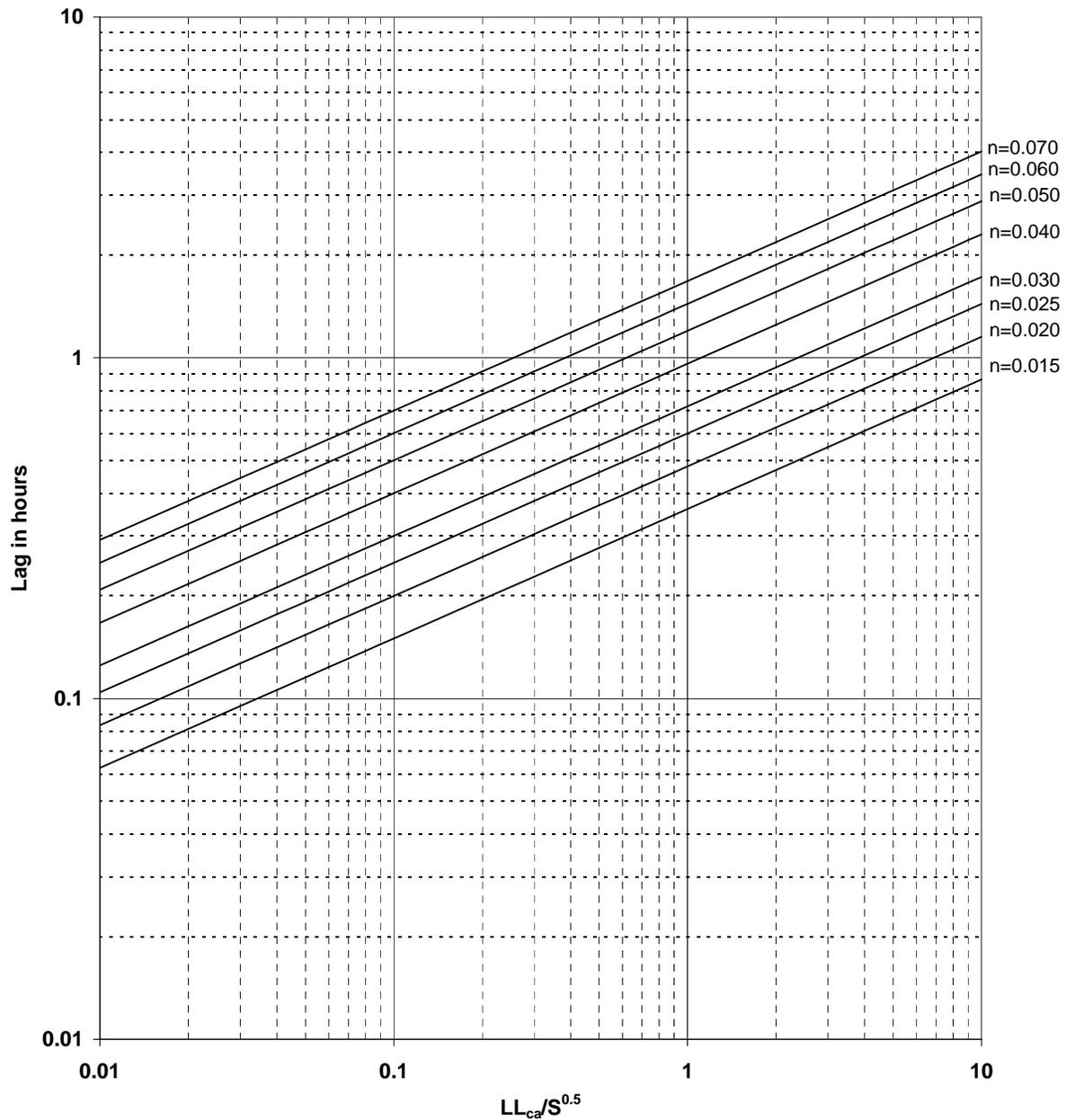
Background image from USGS Topographic Quadrangle:
WALNUT CREEK, 1981
Contour intervals 40 feet

Prepared by J.S.M

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

San Ramon Bypass

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**



NOTE:

L - Length along longest watercourse

L_{ca} - Length along longest watercourse, measured upstream to point opposite of area

S - Overall slope of the longest watercourse between headwater and collection point

Lag - Elapsed time from beginning of unit precipitation to instant that summation hydrograph reaches 50% of ultimate discharge

n - a basin roughness coefficient

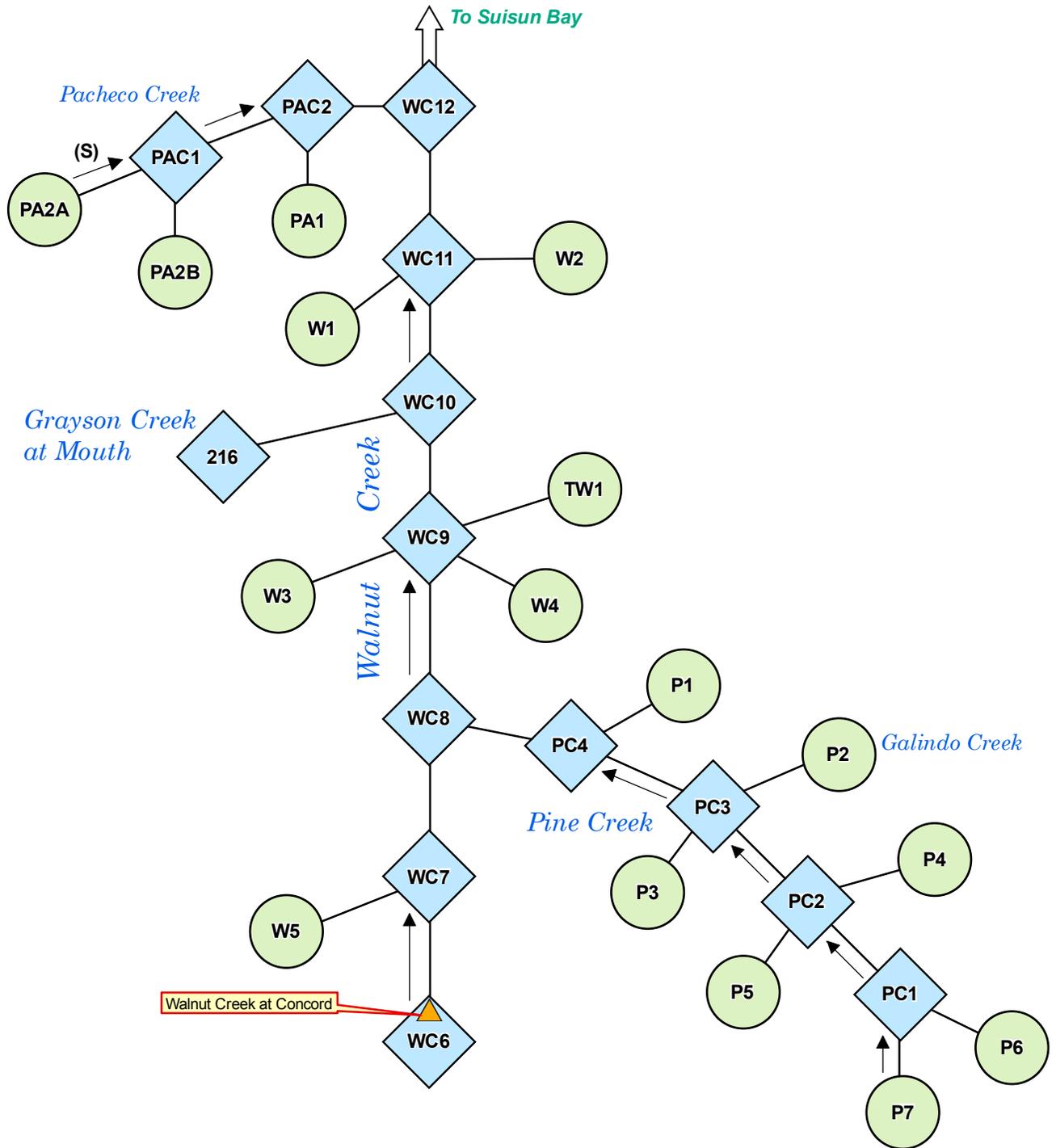
From: Feasibility Study Hydrology, Walnut Creek Basin Interim Office Report, 1992, U.S. Army Corps of Engineers, Sacramento District

Prepared by JLB

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA**

**LAG RELATIONSHIPS
WALNUT CREEK AREA, CALIFORNIA**

**U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT**



Legend

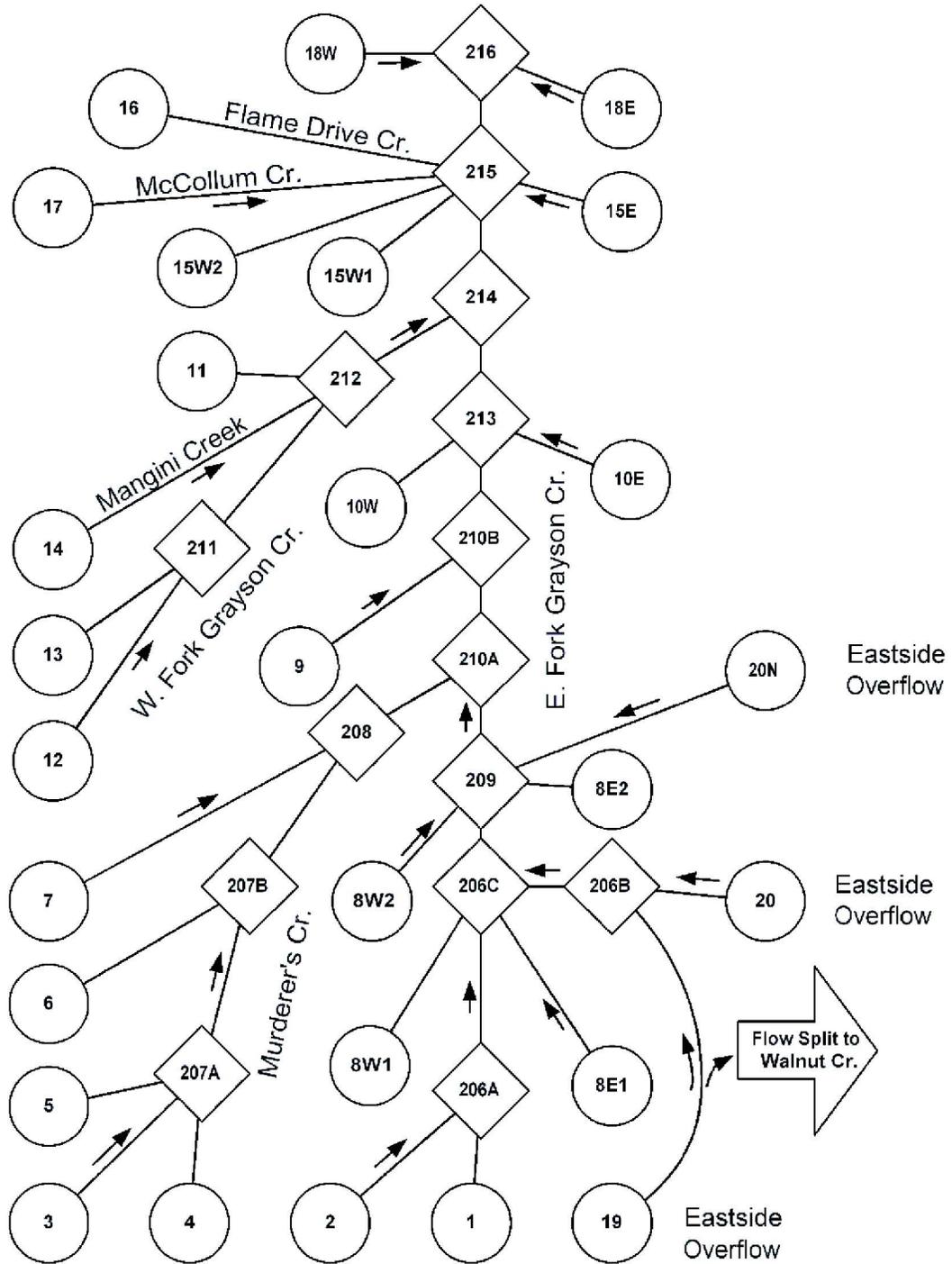
-  Watershed Subbasin
-  Junction Node
-  Routed Flow
-  Storage Routing
-  Stream Gage

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**Pine Creek and
Lower Walnut Creek Diagram
Subbasins and Nodes**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Grayson Cr. at Mouth



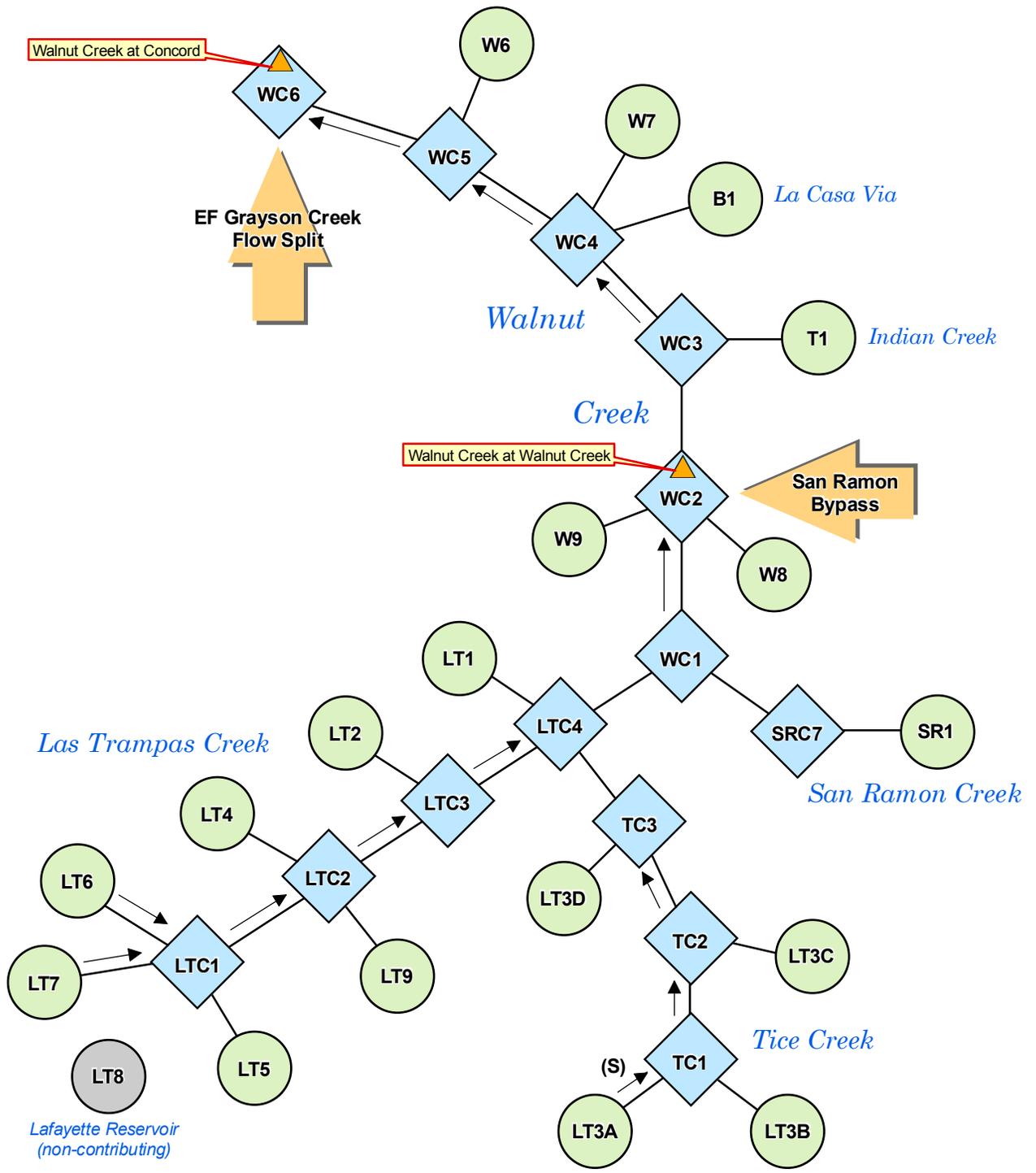
Legend

-  Watershed Subbasin
-  Junction Node
-  Diversion Out of Watershed
-  Flow Connections and Direction

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**GRAYSON CREEK DIAGRAM
SUBBASINS AND NODES**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT



Legend

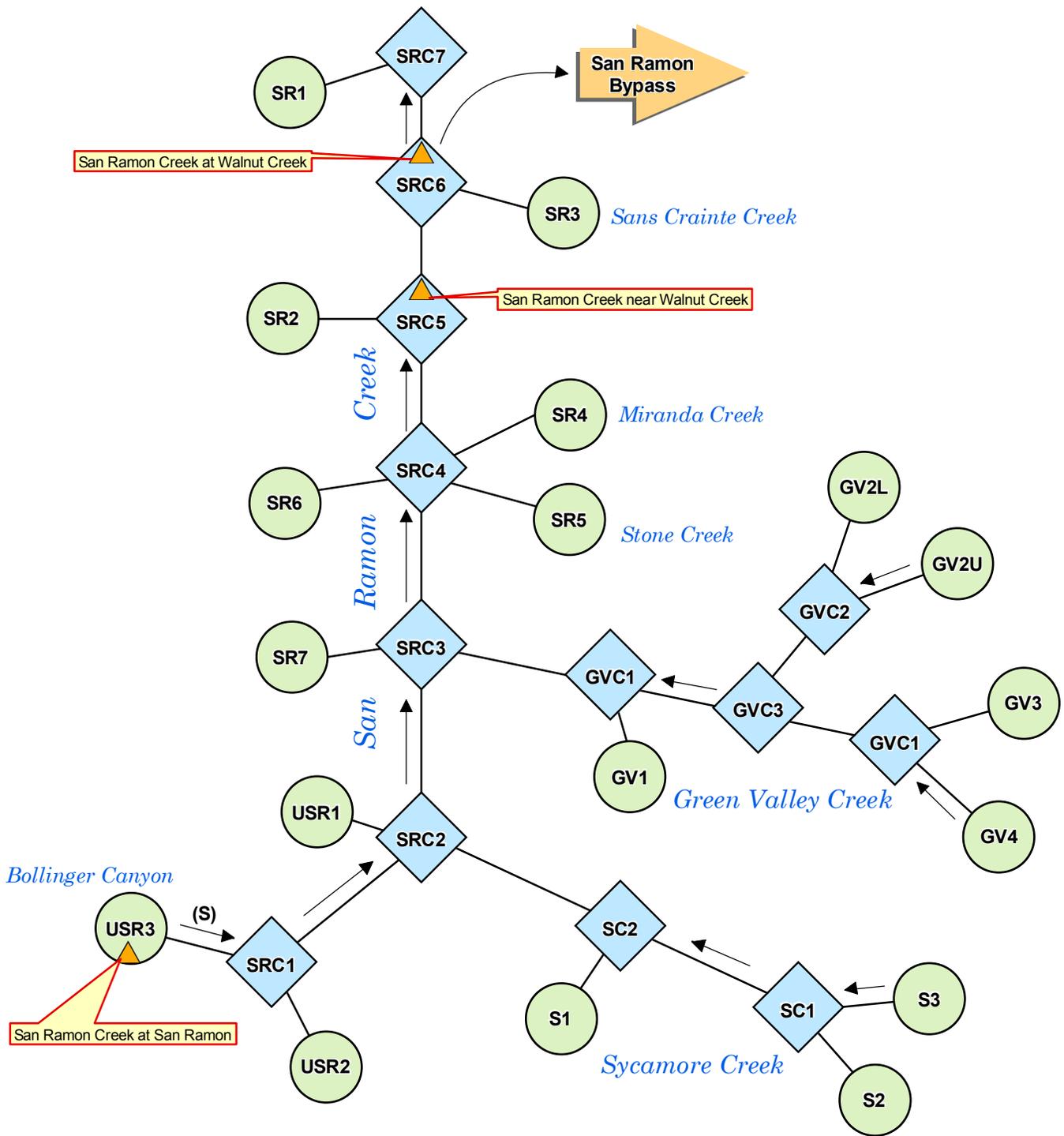
-  Watershed Subbasin
-  Junction Node
-  Diversion Into Watershed
-  Routed Flow
-  (S) Storage Routing
-  Stream Gauge

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**Las Trampas Creek and
Upper Walnut Creek Diagram
Subbasins and Nodes**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Prepared by J.S.M



San Ramon Creek at Walnut Creek

San Ramon Creek near Walnut Creek

San Ramon Creek at San Ramon

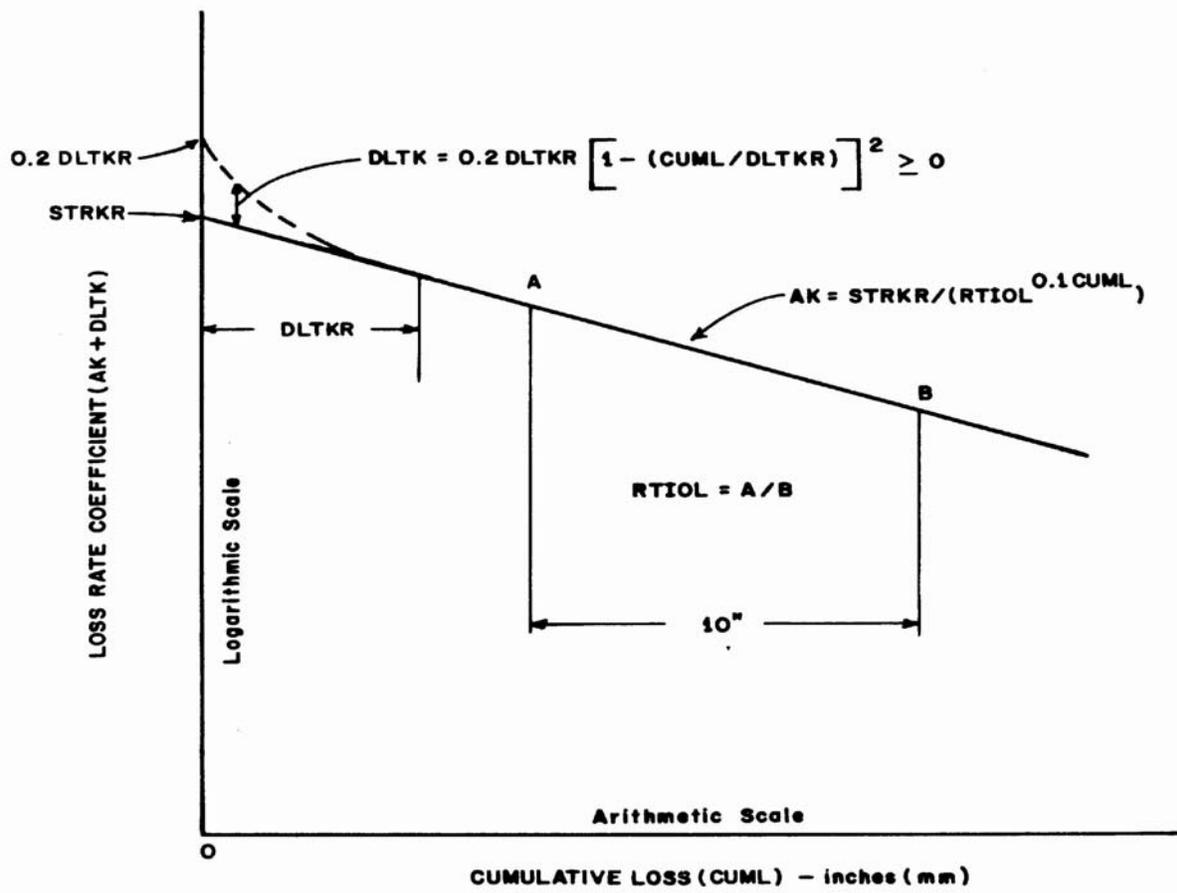
Legend

- Watershed Subbasin
- Junction Node
- Diversion Out of Watershed
- Routed Flow
- (S) Storage Routing
- Stream Gage

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**San Ramon Creek Diagram
Subbasins and Nodes**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT



LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**General HEC Exponential
Loss Rate Function**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Prepared by MHE



Pittsburg

Suisun Bay

Martinez

Mallard Reservoir

Pacheco

Lower Walnut

Lower Walnut Trib

Concord

CONTRA COSTA CO

Clayton

Briones Reservoir

Grayson

Pleasant Hill

Upper Walnut

Walnut Creek

Pine-Galindo

Las Trampas

Lafayette

Orinda

Lafayette Reservoir

Las Trampas Cr

5.06

5.5

Mt Diablo 3,849 ft

6.30

San Ramon

Danville

5.90

6.00

Upper San Leandro Reservoir

7.33

San Ramon

6.00

6.5

5.69

7.5

7.0

6.0

6.5

4.07

0 2 4 Miles

ALAMEDA CO

Lake Chabot



Map Legend

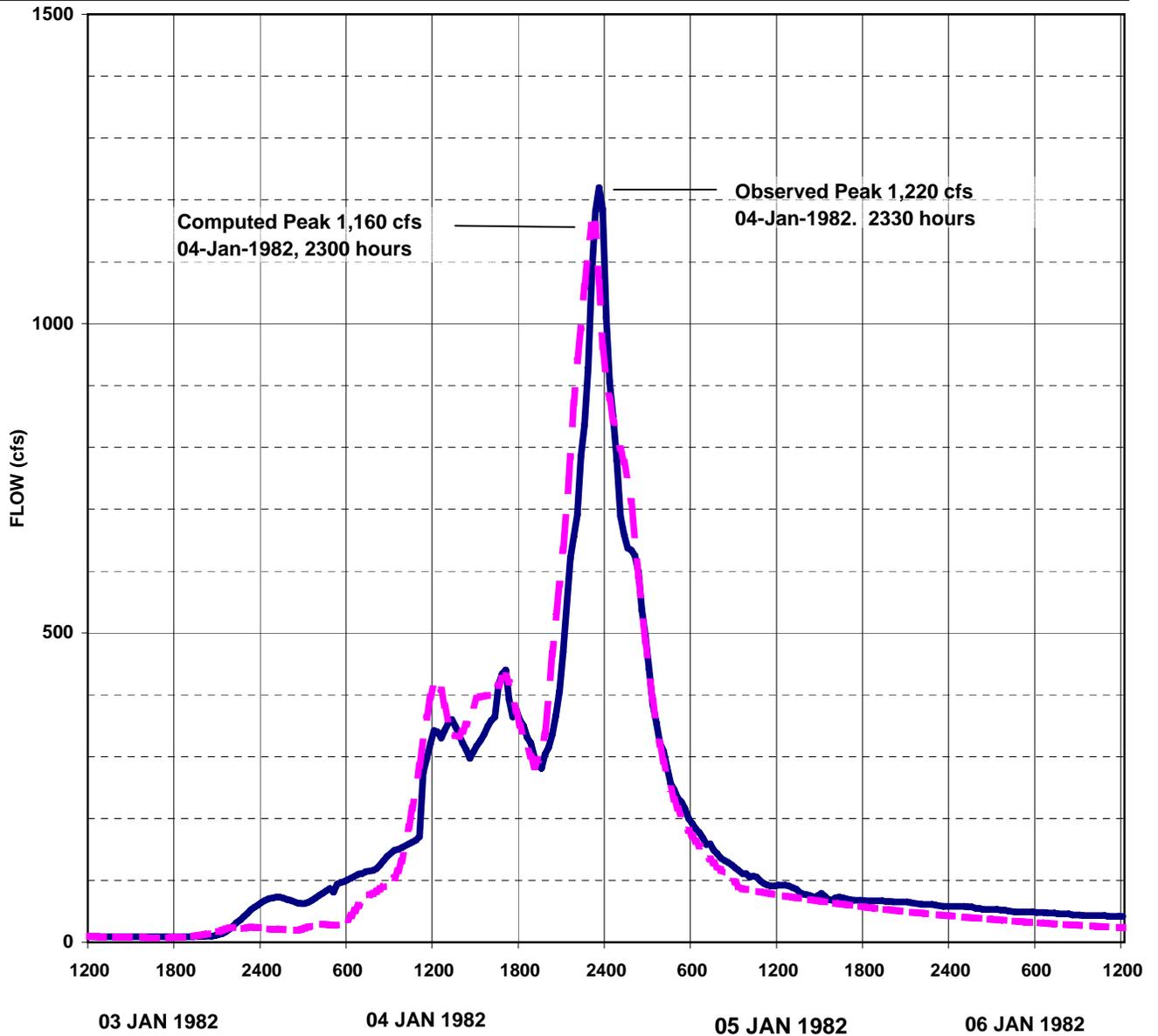
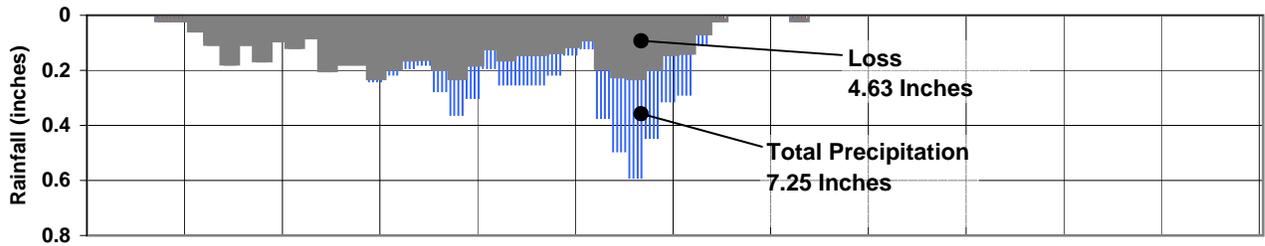
- Subbasin
- Water Body
- Isohyets
- Stream
- Precipitation Gage
- County Boundary
- City

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

Walnut Creek Isohyetal Map
Storm of 03-05 January 1982

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Prepared by J.S.M



— Observed San Ramon Cr
 - - - Computed (HEC-1)

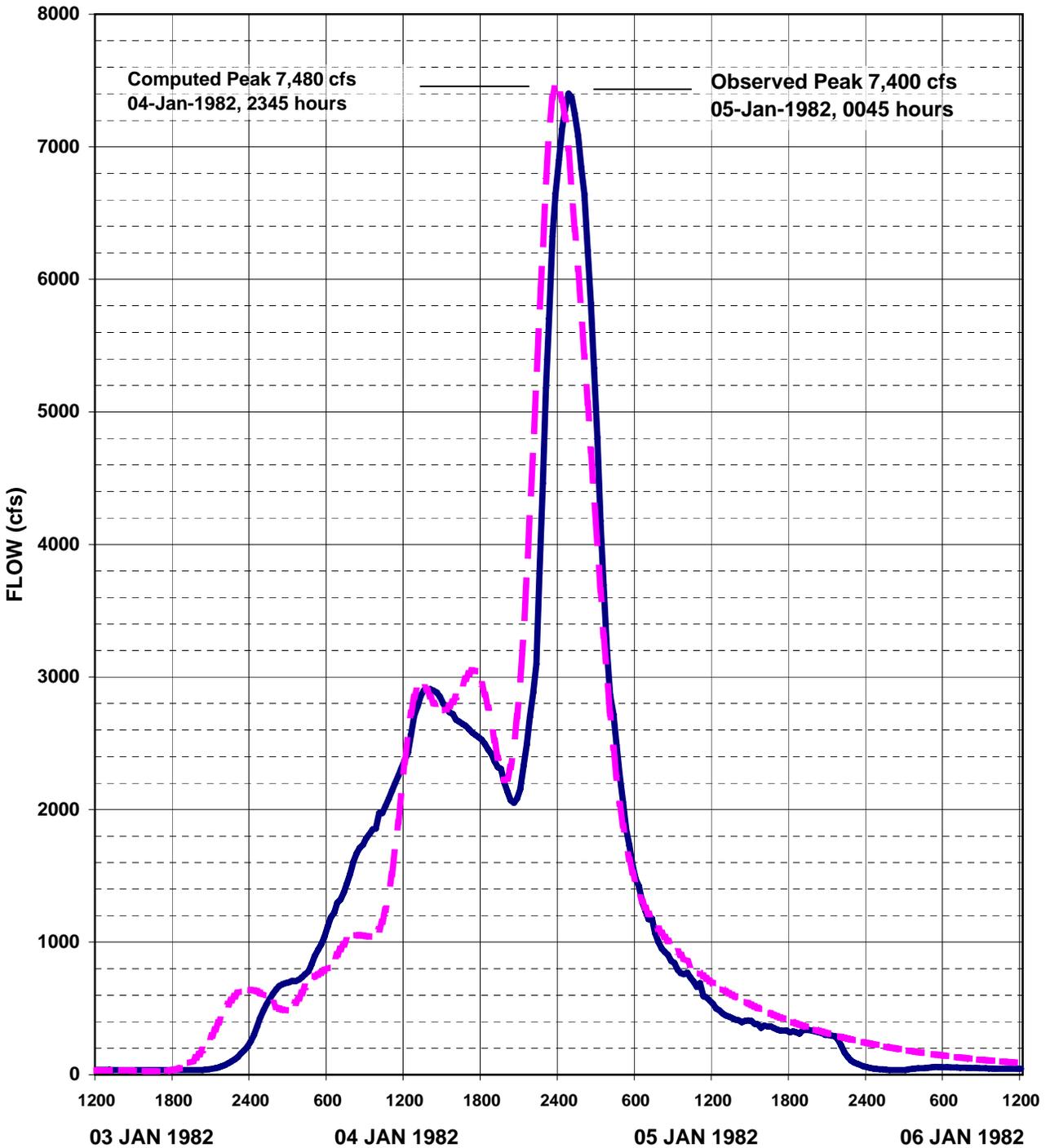
Flow gage: USGS 11182500
 San Ramon Creek at San Ramon
 Drainage Area: 5.89 mi²
 Del Amigo Road Danville Precipitation
 Pattern Used

Developed and prepared by LLW

LOWER WALNUT CREEK
 GENERAL REEVALUATION REPORT
 CONTRA COSTA COUNTY, CALIFORNIA

**Observed vs. Computed
 Flood Hydrograph
 03-06 January 1982
 San Ramon Creek at San Ramon**

U.S. ARMY CORPS OF ENGINEERS
 CONTRA COSTA COUNTY FLOOD CONTROL &
 WATER CONSERVATION DISTRICT

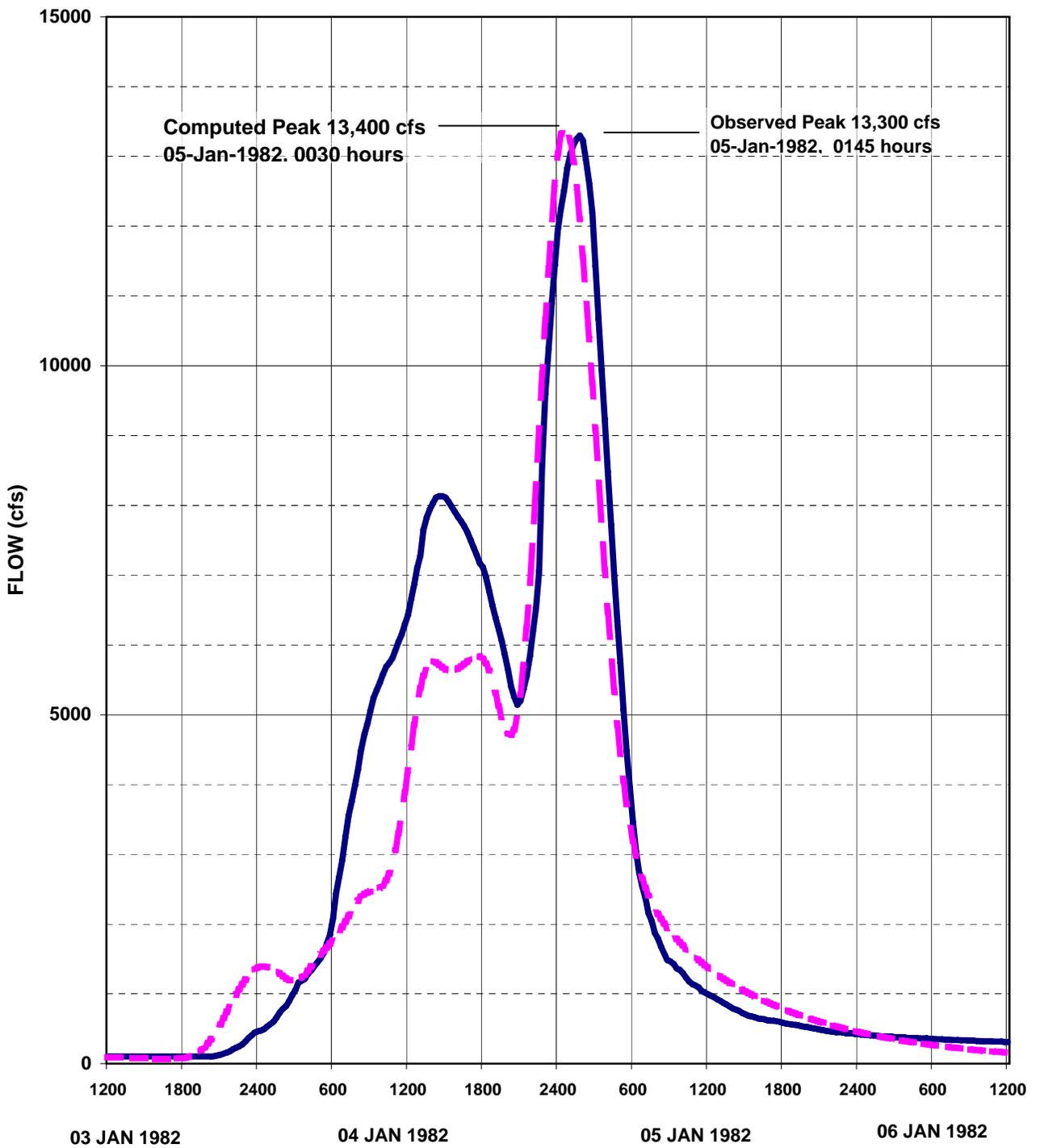


— Observed SR @ WC Gage
 - - - Computed (HEC-1)

Flow gage: USGS 11182800
 San Ramon Creek near Walnut Creek
 Drainage Area: 47.9 mi²

Developed and prepared by LLW

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT CONTRA COSTA COUNTY, CALIFORNIA
Observed vs. Computed Flood Hydrograph 03-06 January 1982 San Ramon Cr Near Walnut Cr
U.S. ARMY CORPS OF ENGINEERS CONTRA COSTA COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT



— Observed Concord Gage
 - - - Computed (HEC-1)

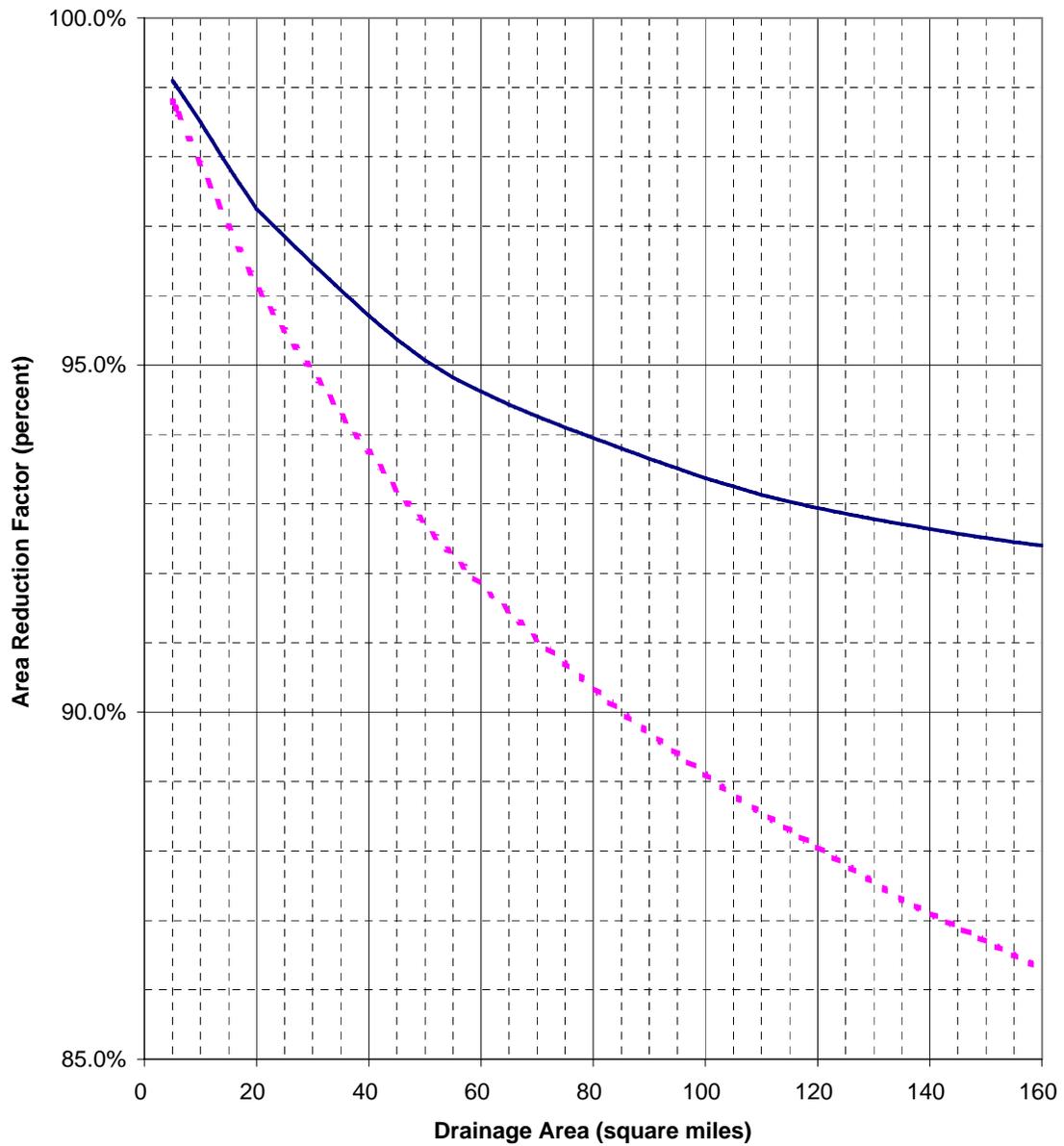
Flow gage: USGS 11183600
 Walnut Creek at Concord
 Drainage Area: 85.2 mi²

LOWER WALNUT CREEK
 GENERAL REEVALUATION REPORT
 CONTRA COSTA COUNTY, CALIFORNIA

**Observed vs. Computed
 Flood Hydrograph
 03-06 January 1982
 Walnut Creek at Concord**

U.S. ARMY CORPS OF ENGINEERS
 CONTRA COSTA COUNTY FLOOD CONTROL &
 WATER CONSERVATION DISTRICT

Developed and prepared by LLW



- - - NOAA Atlas 6-Hr — NOAA Atlas 24-Hr

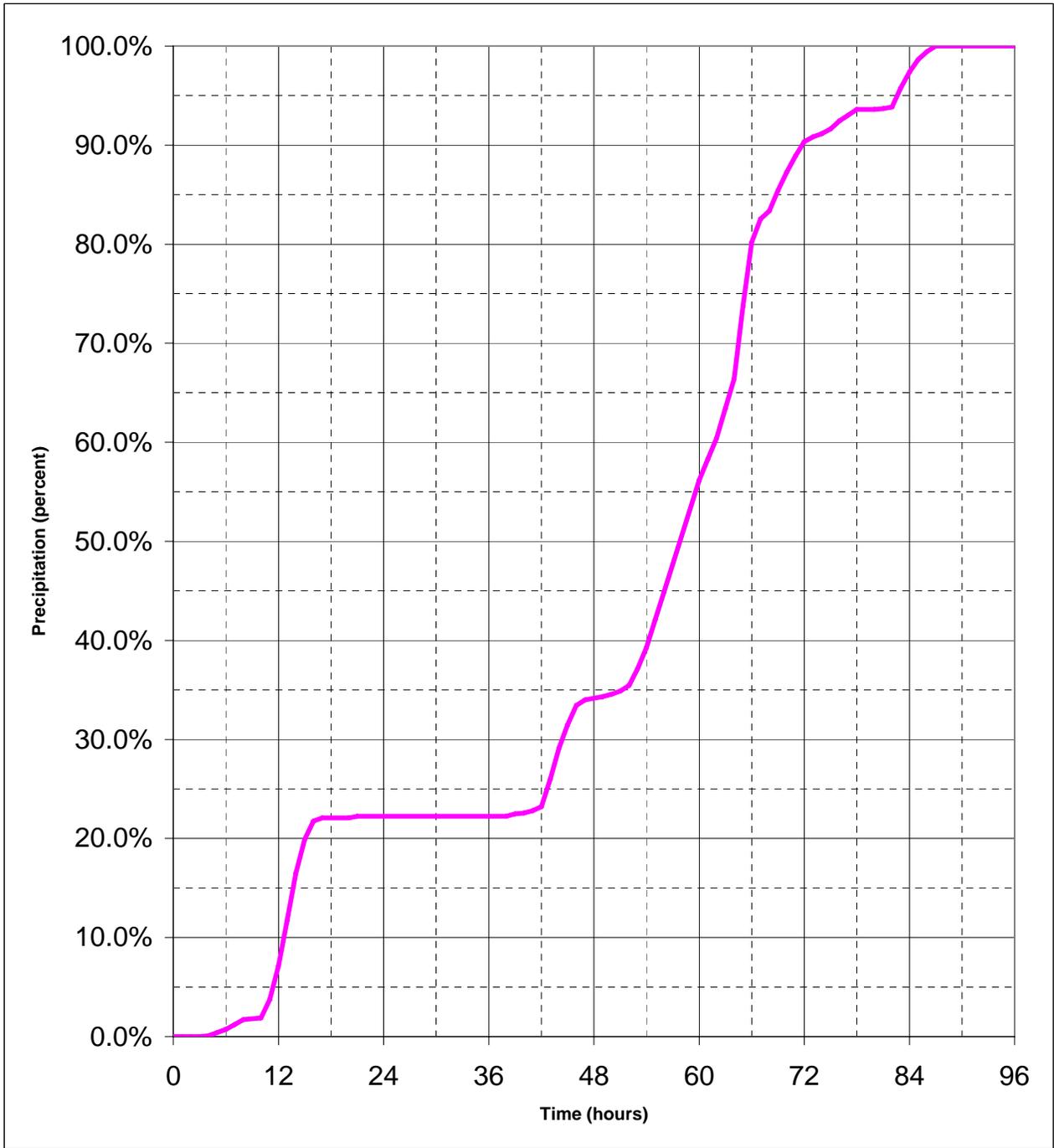
NOAA Atlas 24-hr curve used for general rainstorms

NOAA Atlas 6-hr curve used for 6-hour storms

**LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
 CONTRA COSTA COUNTY, CALIFORNIA**

**NOAA Atlas Storm Depth-Area
 Reduction Curves**

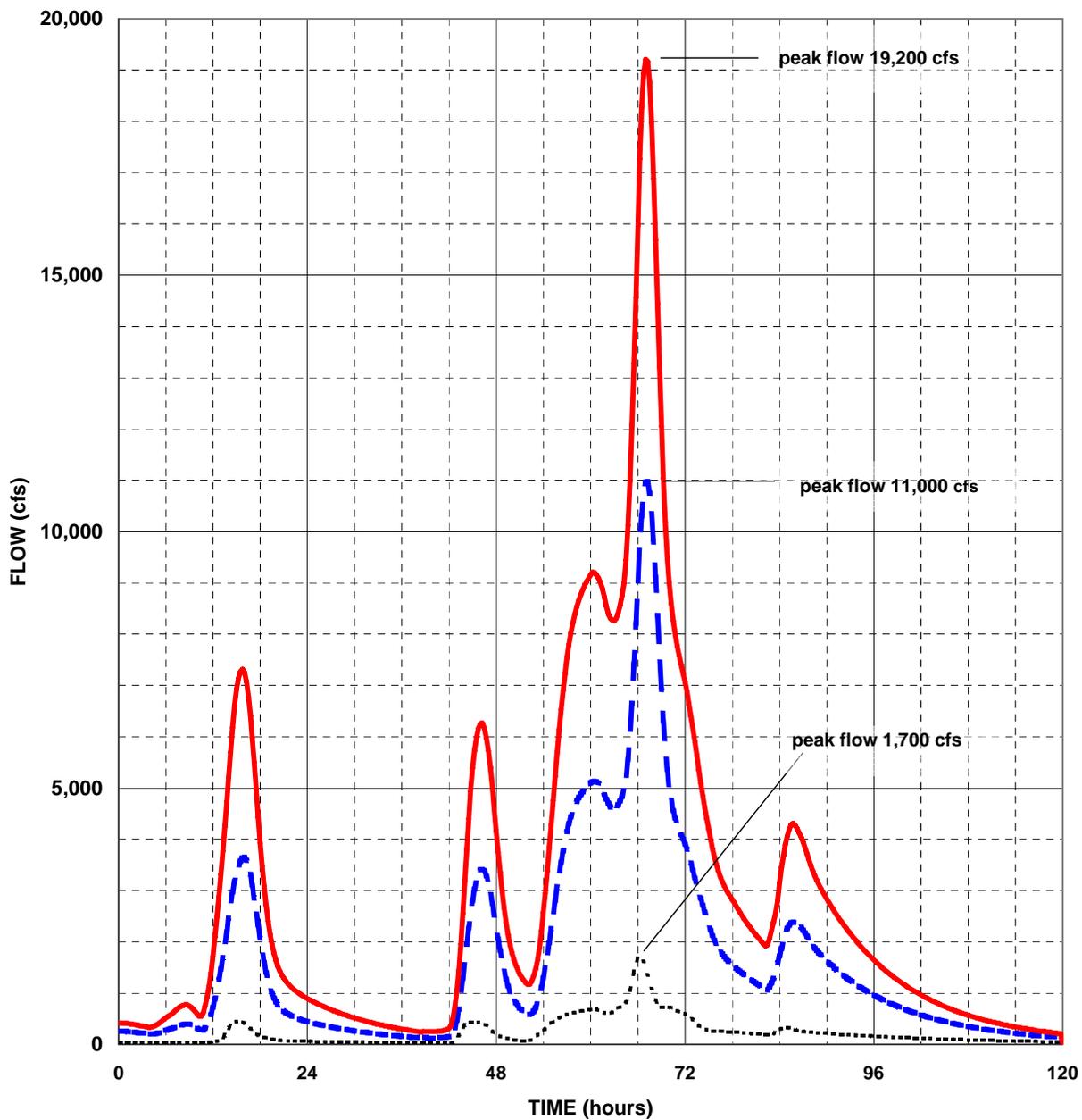
**U.S. ARMY CORPS OF ENGINEERS
 CONTRA COSTA COUNTY FLOOD CONTROL &
 WATER CONSERVATION DISTRICT**



LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**Modified CCC 96-Hour Storm
Distribution Pattern
Rainfall Mass Curve in Percent**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT



- - - SR AT SR - - - SR AT WC - - - WC AT CONC

Drainage Area for:
 San Ramon Cr at San Ramon = 5.89 sq. mi.
 San Ramon Cr at Walnut Cr = approx. 50 sq. mi.
 Walnut Cr at Concord = approx. 80 sq. mi.

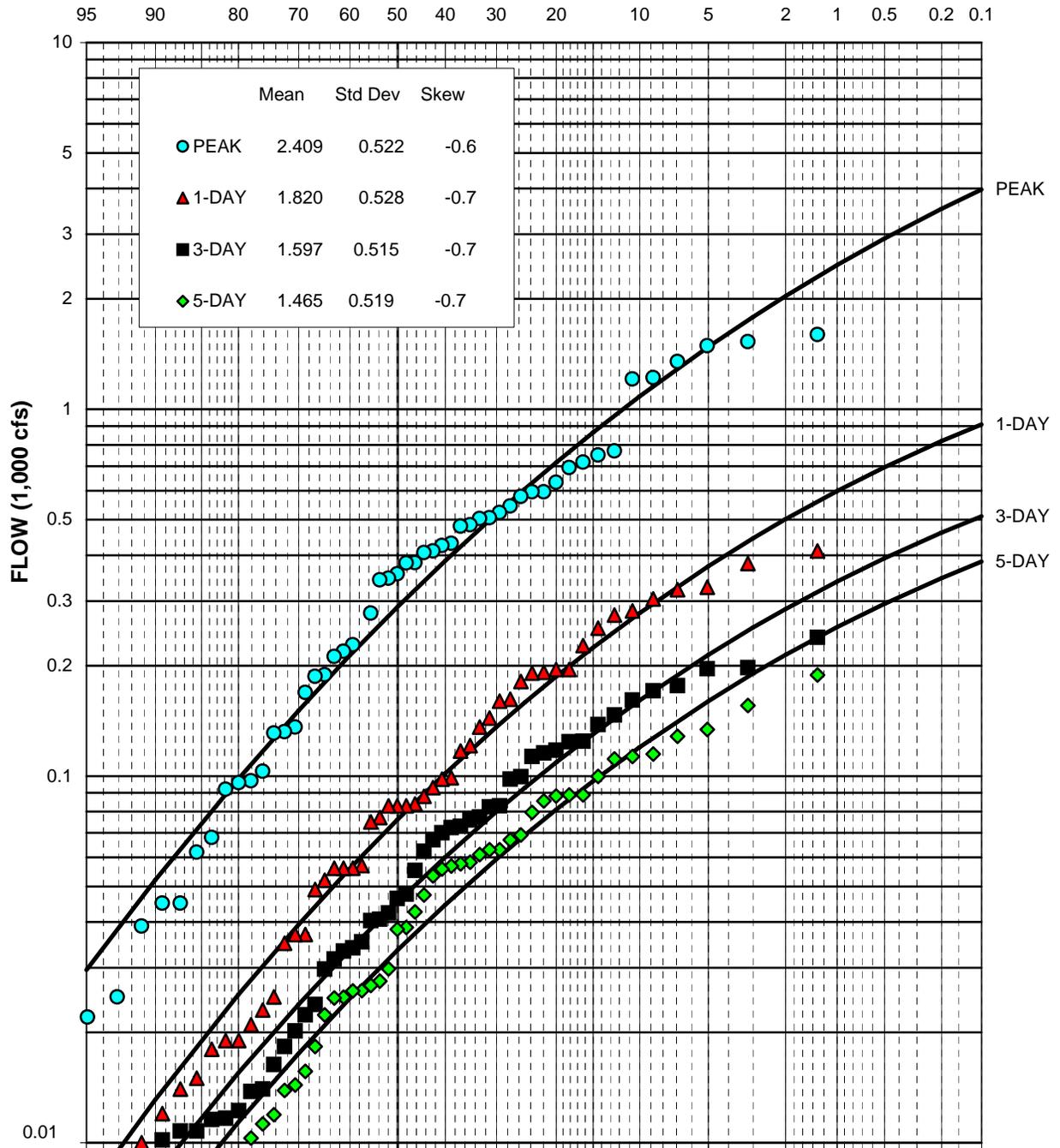
Prepared by LLW

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
 CONTRA COSTA COUNTY, CALIFORNIA

**1% 96-Hour Flood Hydrographs
 for San Ramon and Walnut Creek
 Stream Gage Locations**

U.S. ARMY CORPS OF ENGINEERS
 CONTRA COSTA COUNTY FLOOD CONTROL &
 WATER CONSERVATION DISTRICT

PERCENT CHANCE EXCEEDENCE



NOTES:

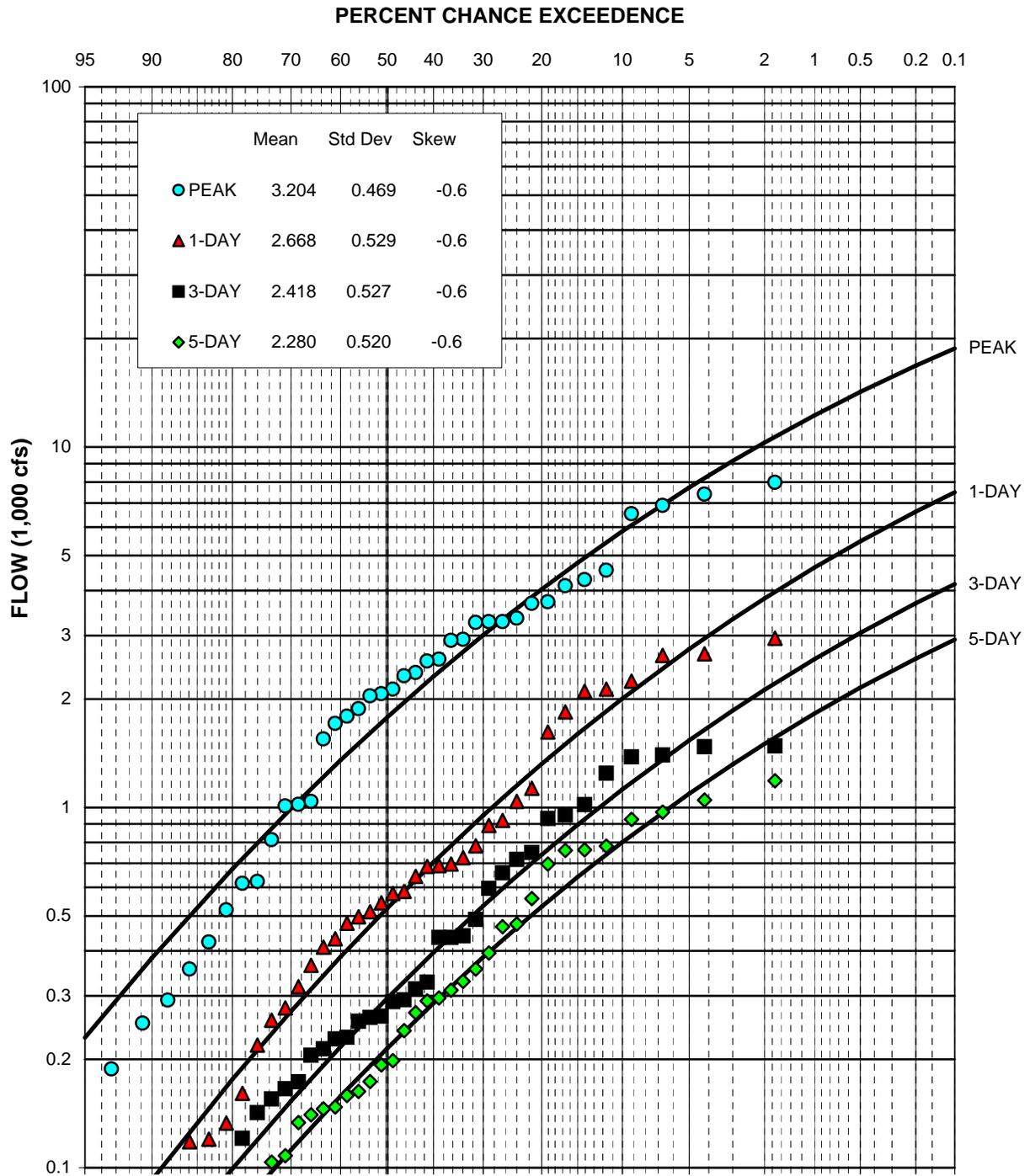
1. Drainage area 5.89 sq. mi.
2. Medium plotting positions
3. Period of record WY 1952-2005
4. FFA statistics, 1977 low outlier
1977 not a low outlier for peak flow

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

Rainflood Frequency Curves
San Ramon Creek at San Ramon Gage
USGS Station 11182500

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Developed by LLW and prepared by JLB



NOTES:

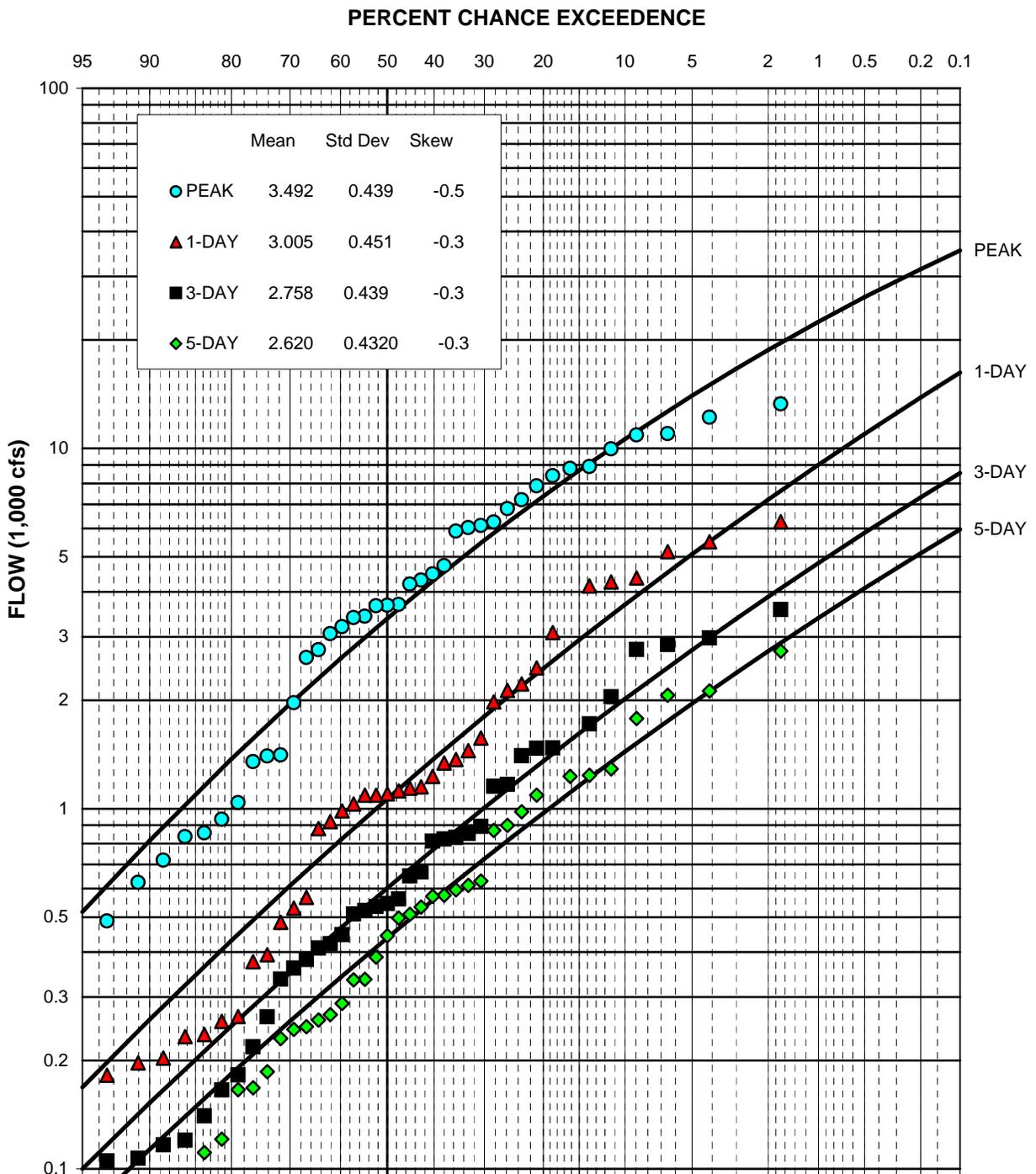
1. Drainage area 50 sq. mi.
2. Medium plotting positions
3. Period of record WY 1953-1992, 40 years
4. FFA statistics, no low outliers
5. Low outlier of 1961 peak only

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**Rainflood Frequency Curves
San Ramon Creek at Walnut Creek**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Developed by LLW and prepared by JLE



NOTES:

1. Drainage area approx. 80 sq. mi.
2. Medium plotting positions
3. Period of record WY 1953-1992, 1997
4. REGFQX statistics, no low outliers
5. Peak computed stats, 41 years

LOWER WALNUT CREEK GENERAL REEVALUATION REPORT
CONTRA COSTA COUNTY, CALIFORNIA

**Rainflood Frequency Curves
Walnut Creek at Concord Gage**

U.S. ARMY CORPS OF ENGINEERS
CONTRA COSTA COUNTY FLOOD CONTROL &
WATER CONSERVATION DISTRICT

Developed by LLW and prepared by JLB