Contra Costa County Flood Control & Water Conservation District

Flood Stage Report

April 9, 2025

Pinole Creek @ San Pablo Avenue

The Contra Costa County Flood Control and Water Conservation District (FC District) received a grant from the State of California Department of Water Resources. The grant program was the Statewide Flood Emergency Response (FER) Grant Round 3 Under, Proposition 84: "The Safe Drinking Water, Water Quality & Supply, Flood Control, River & Coastal Bond Act of 2006 Et Seq." The purpose of the grant awarded to the FC District was to fund a project that would determine flood stage elevations at 12 of the FC District's stream gauges and outreach to agencies and the public about the findings and use of those flood stages. This report documents the flood stage determination for Pinole Creek using the stage at the stream gauge on the San Pablo Avenue bridge over Pinole Creek in Pinole

RESULTS AND HOW TO USE THEM:

Model analysis of the creek shows there could be several flood stage locations along Pinole Creek. Table 1 lists the stream gauge stages along with locations where the associated flooding could occur. A map showing the locations in Table 1 can be found at the end of this document. The creek stage and flood stage can be read from a plot on the FC District's **RainMap** at www.ccflood.us/rainmap.

Table 1: Pinole Creek @ San Pablo Avenue Gauge Stage and Flooding Location List

Flooding Order	Guage Stage	Flooding Location
3rd	12.8	At Brandt Court
2nd	12.1	Between Pear Street and Prune Street or | 500 ft upstream of Railroad Avenue | By Waste Water Treatment plant
1st	11.2	Upstream of San Pablo Avenue

Note: The gauge stage listed is the height of water above the sensor at the gauge. It is not the depth of water in the creek because the sensor is not set at the low point of the creek. The elevation of the water can be calculated by adding 9.26 feet. In the future we will likely provide both stage and elevation in our flood stage information.

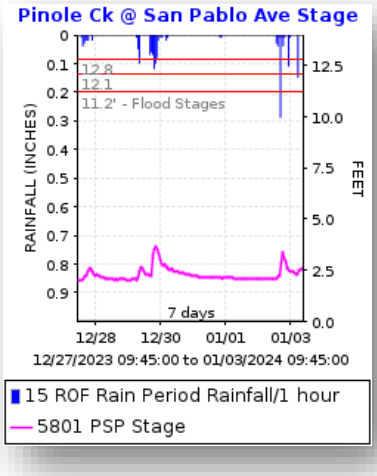
Observing Flood Stage

Anyone with web access can use the FC District's RainMap (www.ccflood.us) to observe the stage at the stream gauge. To view the stream gauge stage, go to RainMap. On RainMap, click the "**Datasets**" button in the upper left. A menu will drop down. Click on "**Water Level**" and the map will show all the points for the stream gauges the FC District operates. Then pan and zoom on the map until you find the location of the stream gauge you are interested in. Click on the point at the stream gauge location and a window for the stream gauge will pop up. The popup will have the name of the stream gauge, a table with the latest stage, and a plot of the stage for the last 7 days. The popup will also have links associated with the gauge (see example below).

Flood Stage Lines

On the plot you see flood stage line(s) matching those in the table above. Not all of the flood stage lines will be shown. Other flood stage lines may be added if it is found they will help communicate the potential flooding better. If you click the plot, it will open another webpage

that has the same 7-day plot you see in the popup and a wider plot of the gauge you choose with data for the last day. That page also has plots of all of the FC District stream gauges with their respective flood stage lines they have been determined.



Flood Stage Information
Above the graph on the popup is a link that says, "Flood Stage Information". Clicking this link will go to a webpage with information about the flood stage. That page has a link which can be clicked to email feedback about when and where flooding from the creek was observed. This feedback is critical for confirming and correcting the flood stage.

HOW THE FLOOD STAGES WERE DETERMINED:
The FC District engineering personnel (staff) started the development of the model by searching for existing models, creek flow data, terrain data, and engineering drawings. These were used to build the initial model. The following explains how each component that went into the model was developed.

Model Limits
The limits of the model for Pinole Creek were from San Pablo Bay to Downer Street.

Hydraulic Model
For this location, a pre-existing HEC-RAS model was used to model flows for this reach of the channel. The model geometry consisted of January 2006 FCD cross sections between Interstate 80 and the AT&SF Railroad and FCD cross sections data collected September 2007 downstream of the railroad. Due to incompleteness of the model, Henry Avenue bridge, AT&SF Railroad bridge, San Pablo Avenue bridge, and two footbridges near San Pablo Avenue were added to the model as part of this project.

After the initial model was complete, additional work was done to refine the model. We performed additional surveys around San Pablo Avenue near the stream gauge. We also adjusted other data. This channel has silt built up in it making modeling the original design based on survey data difficult. The FC District does not have adequate funding to keep this channel clear of sediment and leaving the cross sections with sediment in the model is realistic.

Pinole Creek discharges into San Pablo Bay. The models we found had the beginning water surface elevation as 3.1. We did not work to confirm or correct this value.

Hydrology
Initially, steady flow hydrology data from the FC District records were used. Later, flow data from the USGS StreamStats website were incorporated to create multiple flow values along the creek, increasing progressively downstream. StreamStats is a website based program operated by the US Geological Survey (https://streamstats.usgs.gov/ss/). Flow estimates from StreamStats were generated for 6 locations at Prune Street, Charles Avenue, upstream of the railroad by Senior Center, Rosti, Woodfield, at the Railroad Tracks downstream of Railroad

Aveneu. These points were selected based on locations where significant tributary areas flowing into the creek.

For this project, the goal was to establish flows that maintained consistent relative magnitudes for each increase in stage at the stream gauge, rather than flows based on return periods. StreamStats does assign return periods to its flows using statistical regression. As a result, while the model labels flows with return periods from the StreamStats output (e.g., Q-10yr, Q-25yr), these values may not align with the flow rates the FC District would determine using its own standards.The model was run with 6 different scenarios with increasing flows.

FLOOD STAGE ANALYSIS:

The HEC-RAS model was reviewed and adjusted to meet the project needs while staying within the project schedule and budget. Flow depths were analyzed using RAS Mapper, which overlays floodwater depth on the terrain, making it easy to identify when water levels exceed creek banks. By reviewing each model run, staff could observe where flooding occurred and document the flood flow scenarios and locations. If the results appeared inaccurate, the model was further reviewed and adjusted. Additional flow scenarios may have been incorporated as discussed above.

SUMMARY AND CONCLUSON:

The flood stages presented in this report are intended to increase awareness of potential flooding. However, since these stages have not been validated by actual storm events, they should be used with caution.

Individuals using these flood stages for situational awareness during storms are encouraged to report observations to the FC District at hydro@pw.cccounty.us. Please include the location, time of flooding, and any other relevant details. If the water level rises above the flood stage line without causing flooding, or if flooding occurs before the water reaches the flood stage line, the FC District needs to be informed.

DISCLAIMER:

The flood stages in this report are based on models with inherent limitations and assumptions that may change over time. Use them with caution, as conditions in the creek channel and at bridge crossings can change seasonally and during storms due to debris blockages, bank failures, or fallen trees. Sediment buildup, vegetation growth, and human activities can alter the creek's capacity over time, reducing the accuracy of these models. Such changes may obstruct flow and lead to flooding at lower storm levels than predicted. Also, associated maps and websites may have errors or inconsistencies and real-time data is reliant on power and internet connections which can fail to operate and provide data in a timely manner. During stormy weather power and communications are more prone to fail. Use this information with caution and do not rely solely on this information and associated data when making decisions related to emergency situations.

This report may be revised and updated as needed based on feedback regarding flood stages.

TERMS AND ABBREVIATIONS (not all terms used in this report)**:**

ArcMap is a GIS program (see below) that can be augmented with other installed tools such as HEC-GeoRAS (see below). It is used extensively and is the most widely used GIS software and is created by Esri, Inc.

Geometric data is data representing the geometrical aspects of the creek including elevations, locations of cross section, spacing between cross sections, and bridge geometry information. It also includes values related to hydraulic aspects of the creek including roughness, obstructions, expansion and contraction coefficients.

Graphical Information System (GIS) is a type of mapping software used to storm, map, and analyze geographic data in point, line, polygon, raster and database formats.

HEC-GeoRAS and **HEC-RAS** are software developed by the US Army Corps of Engineers, Hydrologic Engineering Center (HEC) who developed the River Analysis System (RAS) software. RAS Mapper works inside HEC-RAS.

LiDAR stands for **Li**ght **D**etection and **R**anging and is a remote sensing technology that uses lasers to measure distances and create 3D maps. The data used was collected by LiDAR equipment mounted in an airplane.

File path: G:\fldctl\Hydrology\Streamflow\Flood Stage Reports\Final Flood Stage Reports\Pinole Creek @ San Pablo Avenue.docx

Attachment: Map

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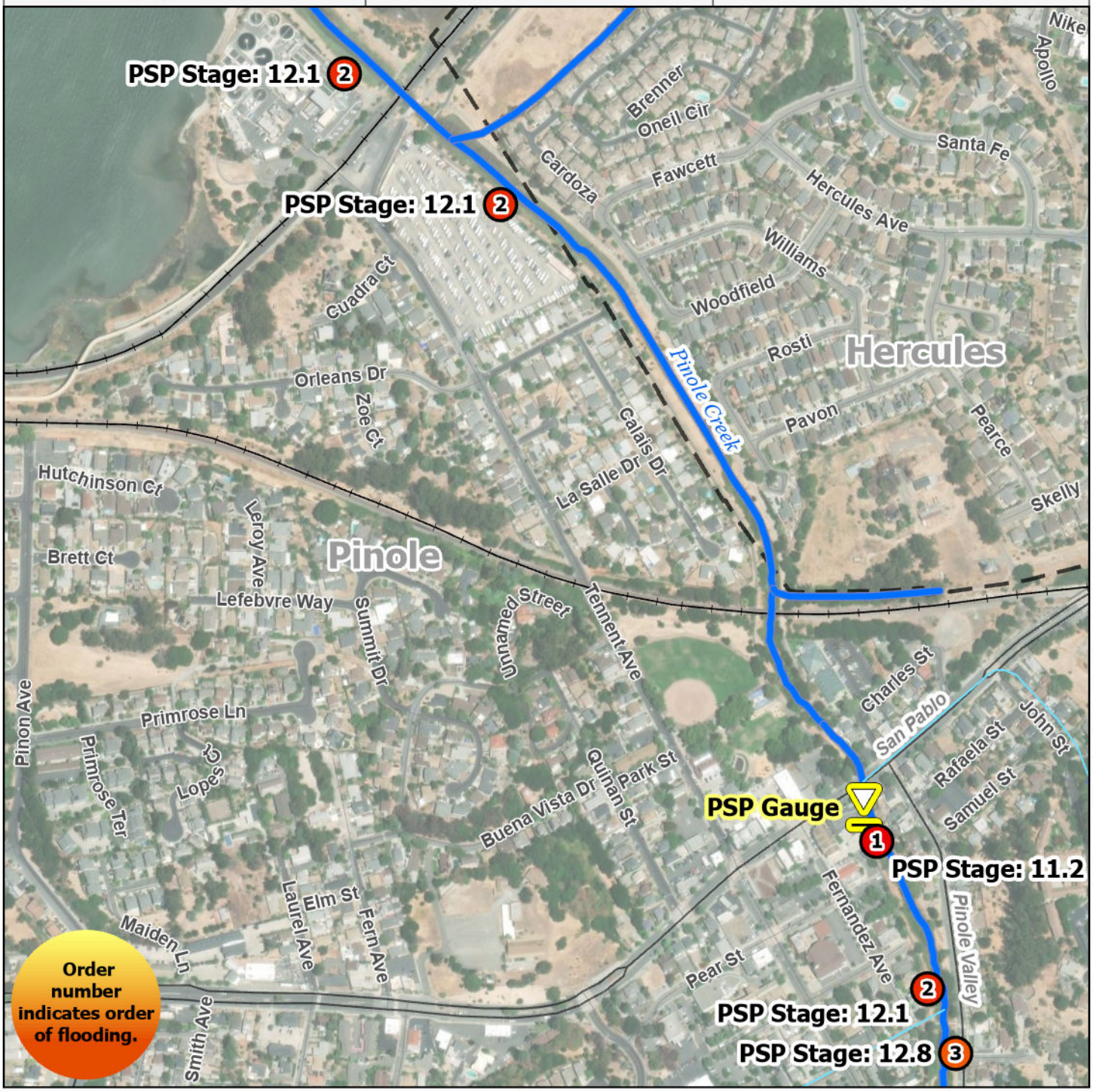
Flood Stages

Pinole Creek @ San Pablo Ave (PSP)



MODELING DISCLAIMER
The flood stages on this map are based on models with inherent limitations. Use with caution, as creek and bridge conditions may change before and during storms due to debris blockages, bank failures, or fallen trees, potentially causing flooding at lower levels than indicated.

Legend

- 1 — Flood Location and Order
- Stream Gages
- 9 / 1 — Order of Flood Stage
- Creeks
  - Creeks
  - Underground Creeks

1:6000

0 305 610

Feet

N

Pg 1 of 1 PSP

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5/1/2025 by: A Torres and M. Boucher