Contra Costa County Flood Control & Water Conservation District

Flood Stage Report

April 10, 2025

Galindo Creek @ Treat Boulevard

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 stages determination for Galindo Creek using the stage at the stream gauge upstream of Treat Boulevard just upstream of the bridge serving a development off of Bel Air Drive in Concord. This gauge is known as "Galindo Creek at Treat Boulevard" in Concord.

RESULTS AND HOW TO USE THEM:

Model analysis of the creek shows there could be several flooding locations along Galindo 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: Galindo Creek @ Treat Boulevard Gauge Stage and Flooding Location List

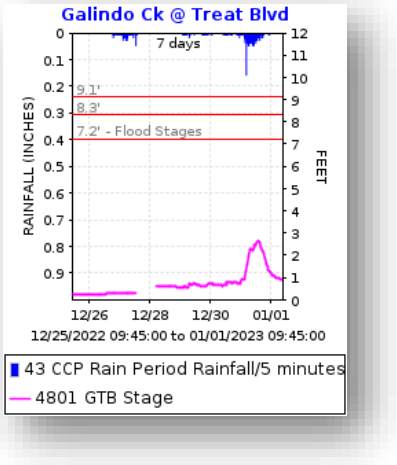
Flooding Order	Guage Stage	Flooding Location
3rd	9.1	Almendra | Ridge Park Drive Ridgewood Drive | Cape Codd Way
2nd	8.3	Cowel Road | St. Francis Drive Court Lane | Bel Air Drive Near Gage | Wharton Way Trail
1st	7.2	Basset Drive

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 176.37 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 Galindo Creek were from San Miguel Road to 1,600 ft upstream of Ayers Road.

Hydraulic Model
For this study, a new hydraulic model was created using 2008 LiDAR data from Contra Costa County. Geometric data was organized in the ESRI ArcMap GIS program and processed using the HEC-GeoRAS application tools. The output from these tools was used to create the HEC-RAS program. LiDAR as used to extact the cross sections used in the model.

After the first review, it was evident that the LiDAR data was poor under the tree canopy that covers the creek in places. Using RAS Mapper, adjustments were made to the cross sections' locations to have them "miss" places in the model that indicated false "obstructions" in the creek due to poor LiDAR data. In some places cross sections were interpolated or modified to approximate the creek bed based on nearby cross sections.

The upstream and downstream boundary conditions for all model runs were set to normal depth and the same slope for all model runs (runs) for the creek. This means that for each run the beginning water surface elevations at the model boundaries would vary based on the flow rate an slope of the channel.

Staff collected as-built plans for several, but not all, bridges. Surveys were performed at paths that cross the creek in Newhall Park. The staff performed field surveying on other key bridges and cross sections. Staff also visited the creek to visually assess what the LiDAR based terrain

model was showing. Staff also reviewed surveyed areas to acertain how best to model the more complicated and critial areas.

Additional surveys and modeling attention was given to the area around the stream gauge as this was one of the locations that the model indicated flooding could occur.

In the end the geometric data for the model was not perfect and the effort to make it perfect was beyond the scope and budget of the grant funded project. However, the FC District felt the model was adequate for the limited purpose of the project.

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 10 locations at Red Oak Dr., Ayers, Indian Ln, Wharton, Treat Blvd, Lucas Lane, Cowell Rd, Bon Homme Way (extended), Ridge Park Dr, and upstream of Almendra Court. 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 working to stay 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.

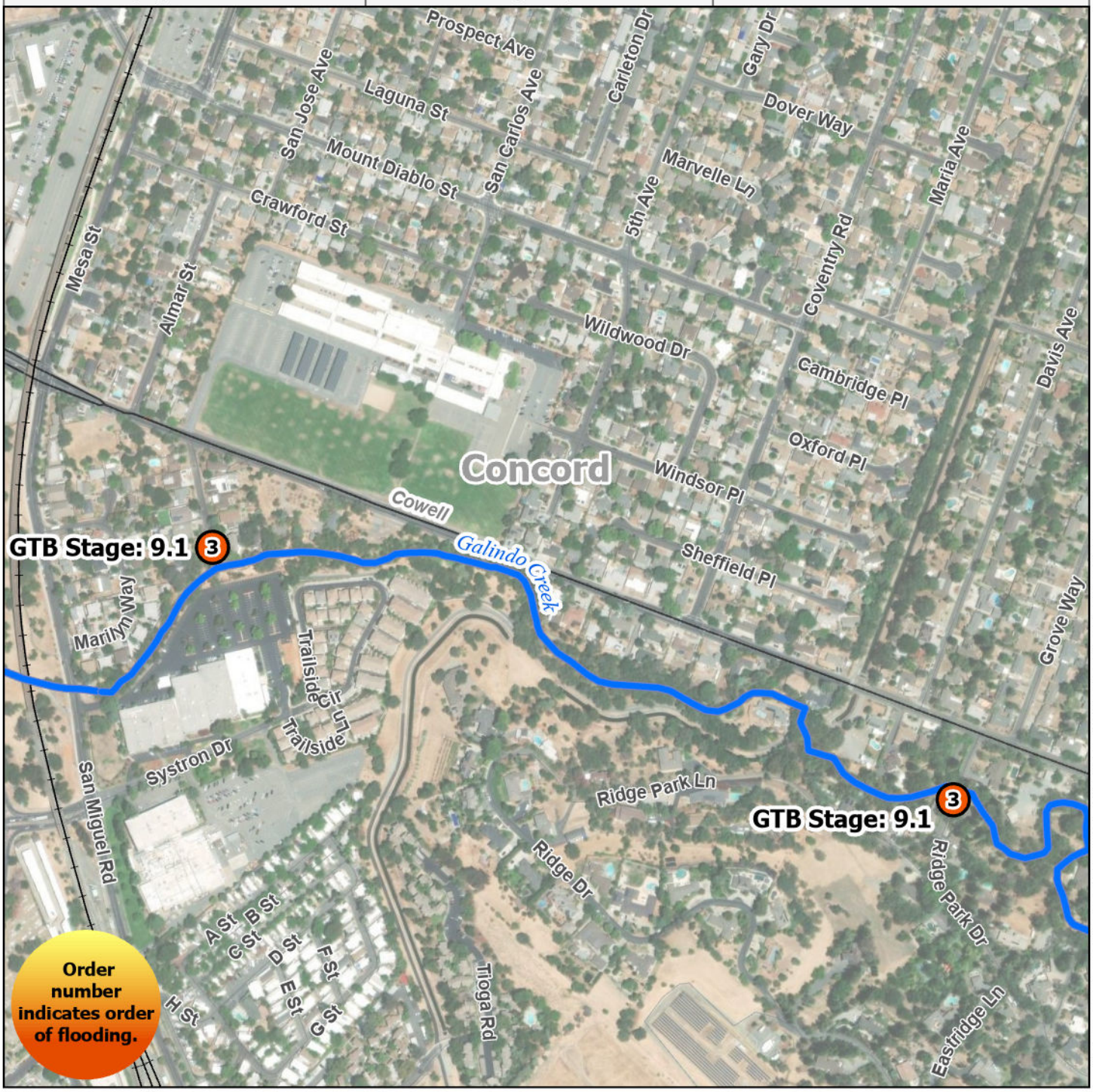
File path: G:\fldctl\Hydrology\Streamflow\Flood Stage Reports\Final Flood Stage Reports\Galindo Creek @ Treat Boulevard.docx

Attachment: Map

Contra Costa County Flood Control and Water Conservation District
255 Glacier Drive
Martinez, CA 94553
(925) 313-2000

Flood Stages

Galindo Creek @ Treat Blvd (GTB)



MODELING DISCLAIMER
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Legend

- 1 — Flood Location and Order
- Order of Flood Stage (9 to 1)
- Stream Gages
- Creeks
  - Creeks
  - Underground Creeks

1:6000

0 305 610
Feet

N

Pg 1 of 4 GTB

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

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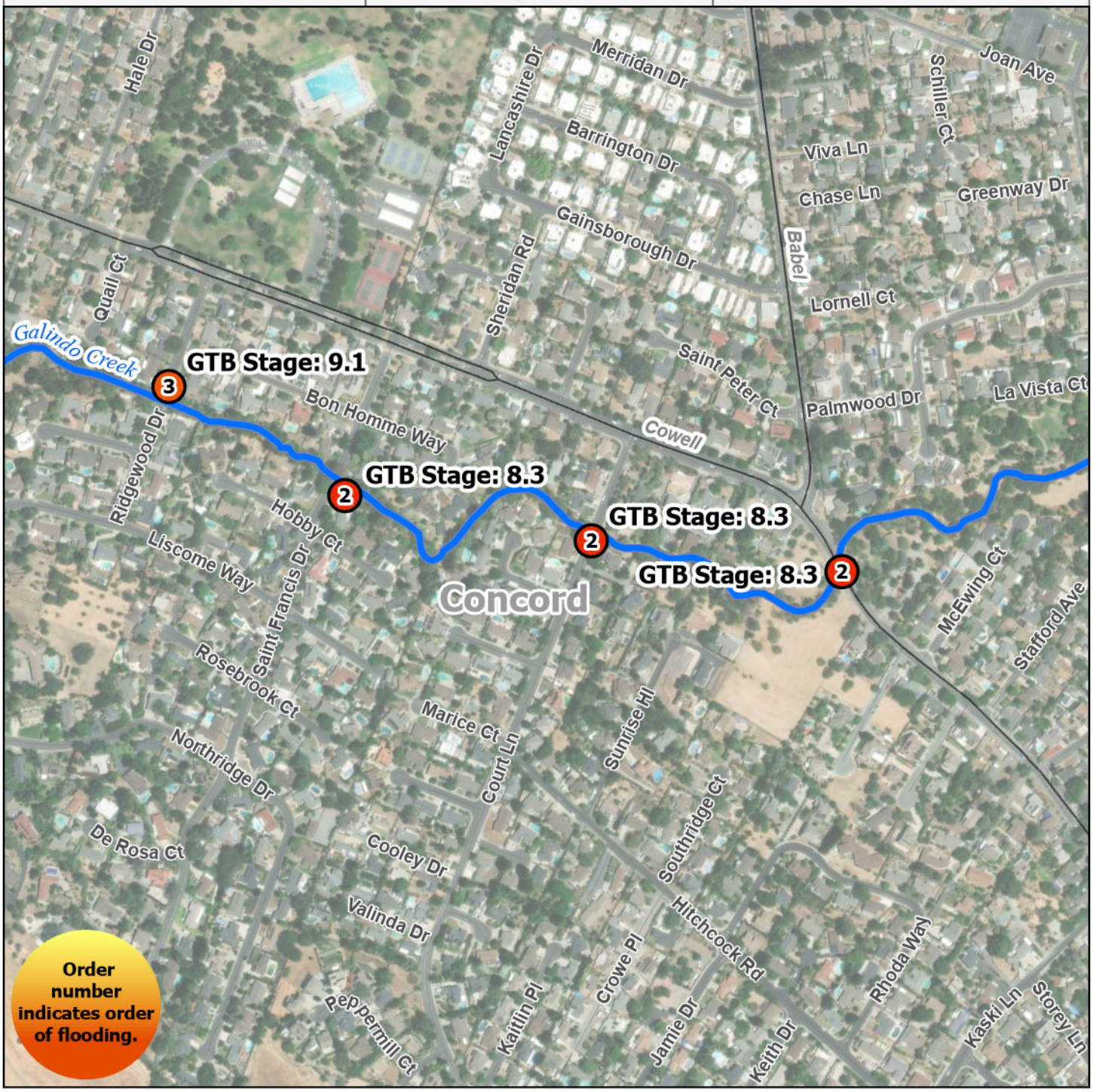

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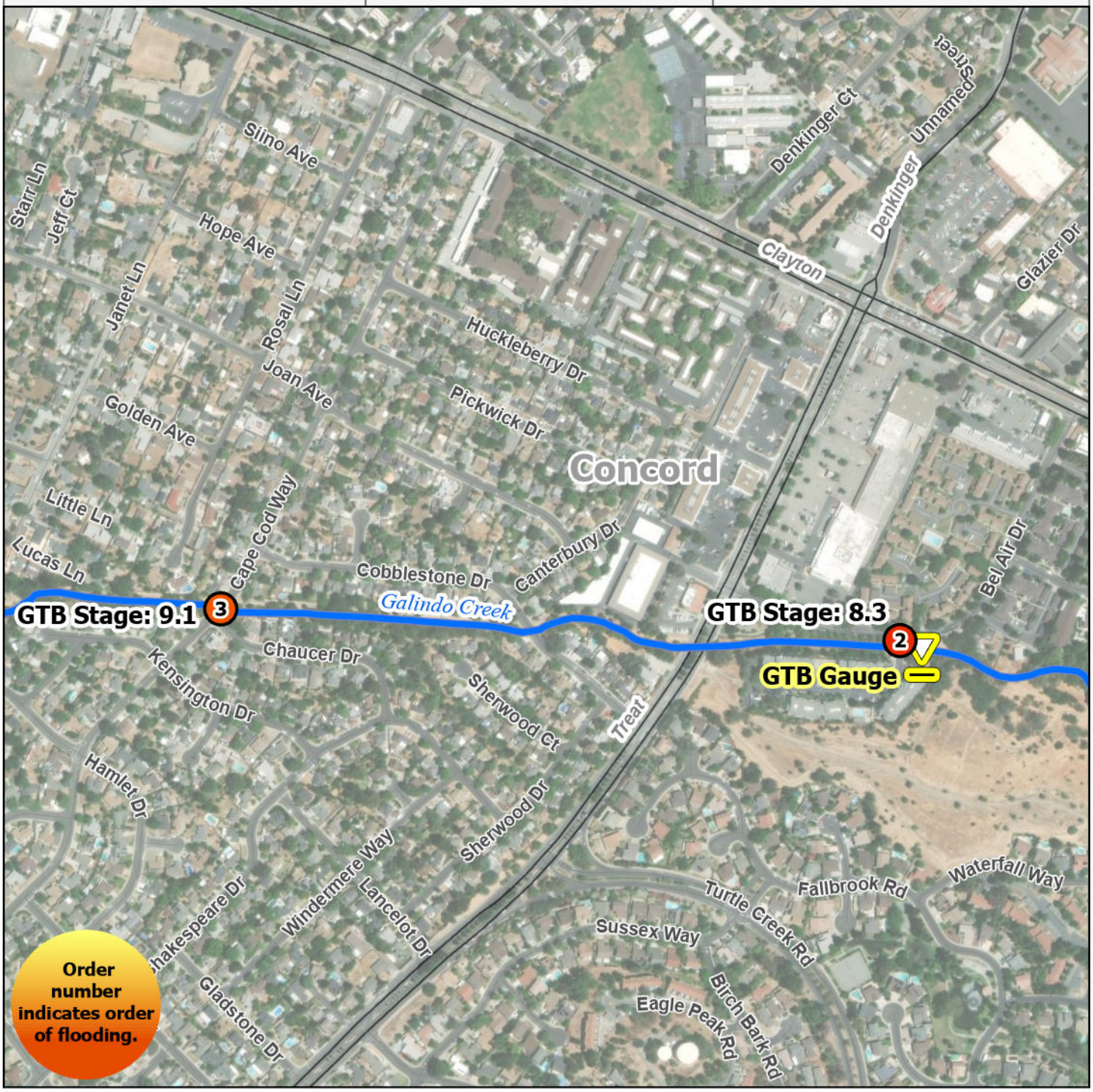

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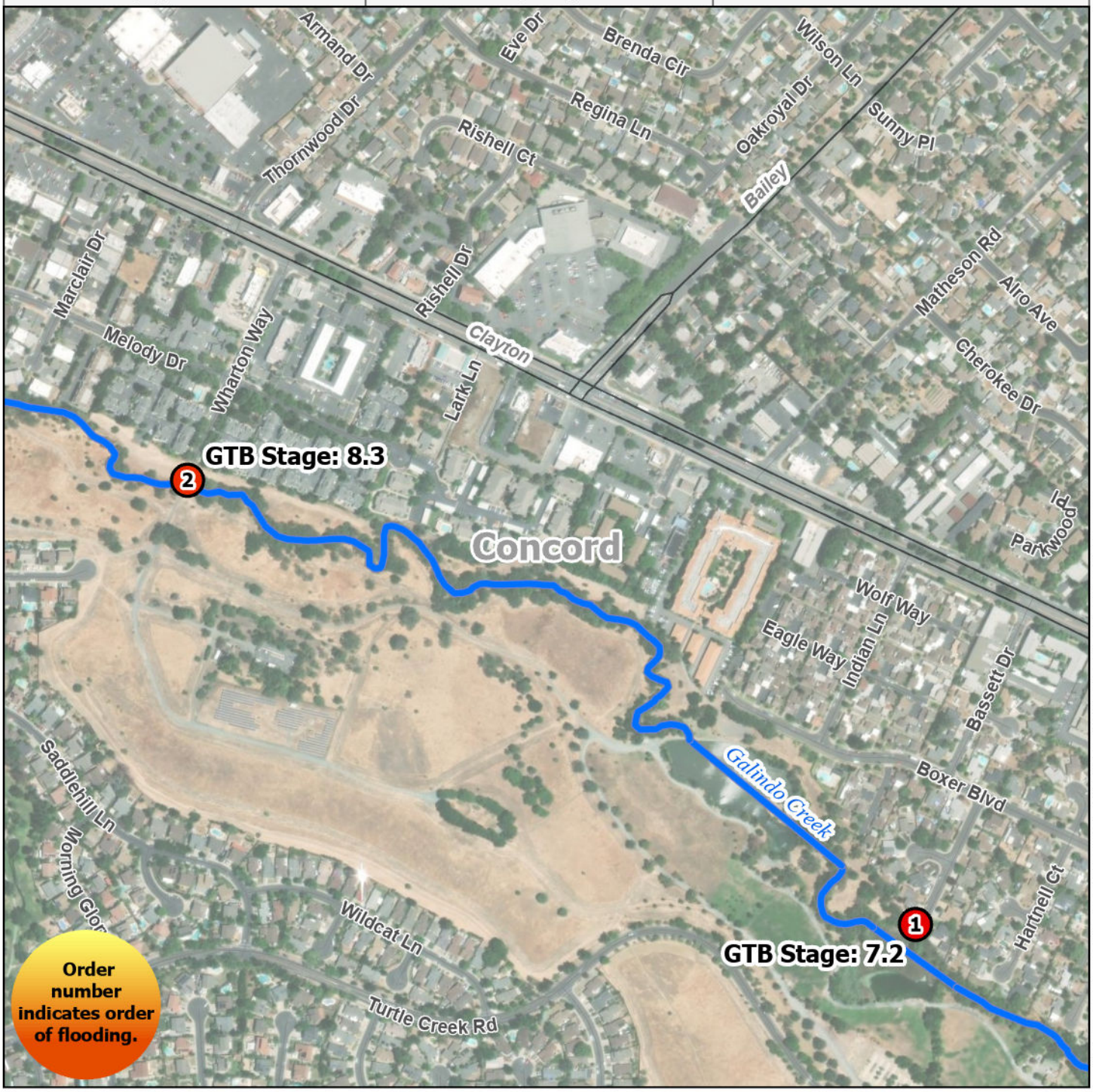

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