



Green Valley Creek @ Diablo Road

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 Green Valley Creek using the stage at the stream gauge upstream of the first (south) bridge crossing of Diablo Road over Green Valley Creek in Danville.

RESULTS AND HOW TO USE THEM:

Model analysis of the creek shows there could be several flood stage locations along Green Valley 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: Green Valley Creek @ Diablo Road Gauge Stage and Flooding Location List

Flooding Order	Gauge Stage	Flooding Location
4 th	9.2	350' downstream 2nd crossing of Diablo Road 850' upstream 1st (southern) crossing of Diablo Road
3 rd	8.4	Green Valley Ct. Buchanan Lane 450' E of Sorrel Ct. 890' E of Sorrel Ct. 600' and 800' upstream 2nd (northern) crossing of Diablo Road
2 nd	7.6	400' upstream 2nd (northern) crossing of Diablo Road Diablo Road - 1st (southern) Crossing
1 st	7.4	Near Donna Lane Liahona Lane 260' E of Sorrel Ct. Green Vly Pool

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 374.19 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](http://www.ccflood.us) (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

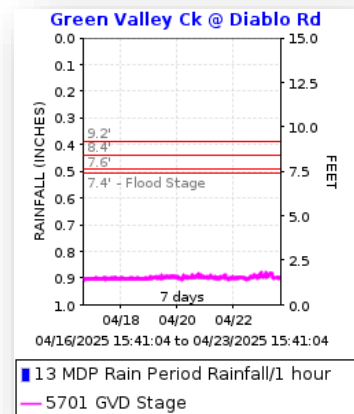
popup will have the name of the stream gauge, a table with the latest stage, and a plot of the stage for the last 7 days. The popup will also have links associated with the gauge (see example below).

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 Green Valley Creek were from I-680 to below Stone Valley Road and on the East Branch of Green Valley Creek below Clydesdale Drive.

Hydraulic Model

For this study, a new hydraulic model was created using LiDAR data from Contra Costa County data. Geometric data was organized in the ArcMap program and processed by the HEC-GeoRAS application to be tested under flood circumstances in the HEC-RAS program. From there, modifications were made to bank stations and bridges to create a working model. The boundary conditions assumed normal depth flow using channel slopes from the LiDAR data. For modeled scenario the water surface elevation (WSE) at the location of the stream gauge was captured. The stage at the gauge was calculated by subtracting the elevation of the stream gauge sensor (374.19 ft NAVD 88) from each of the WSE values.

Staff collected as-built plans for several, but not all, bridges. The staff performed field surveying on some key bridges and cross sections. Staff also visited the creek to visually confirm what the LiDAR based terrain model was showing. 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

The FC District has hydrology points for Green Valley Creek. These were used in the model to analyze the creek. The five flow points included flows at the upstream ends of the two upper tributaries, at the upper end of the lower tributary (where the upper tributaries combine), at the first (south) crossing under Diablo Road, and approximately 845 feet upstream of I-680. A few missing flows were filled in proportionally with others.

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 CONCLUSION:

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 store, 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 **L**ight **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\Green Valley Creek @ Diablo Road.docx

Attachment: Map

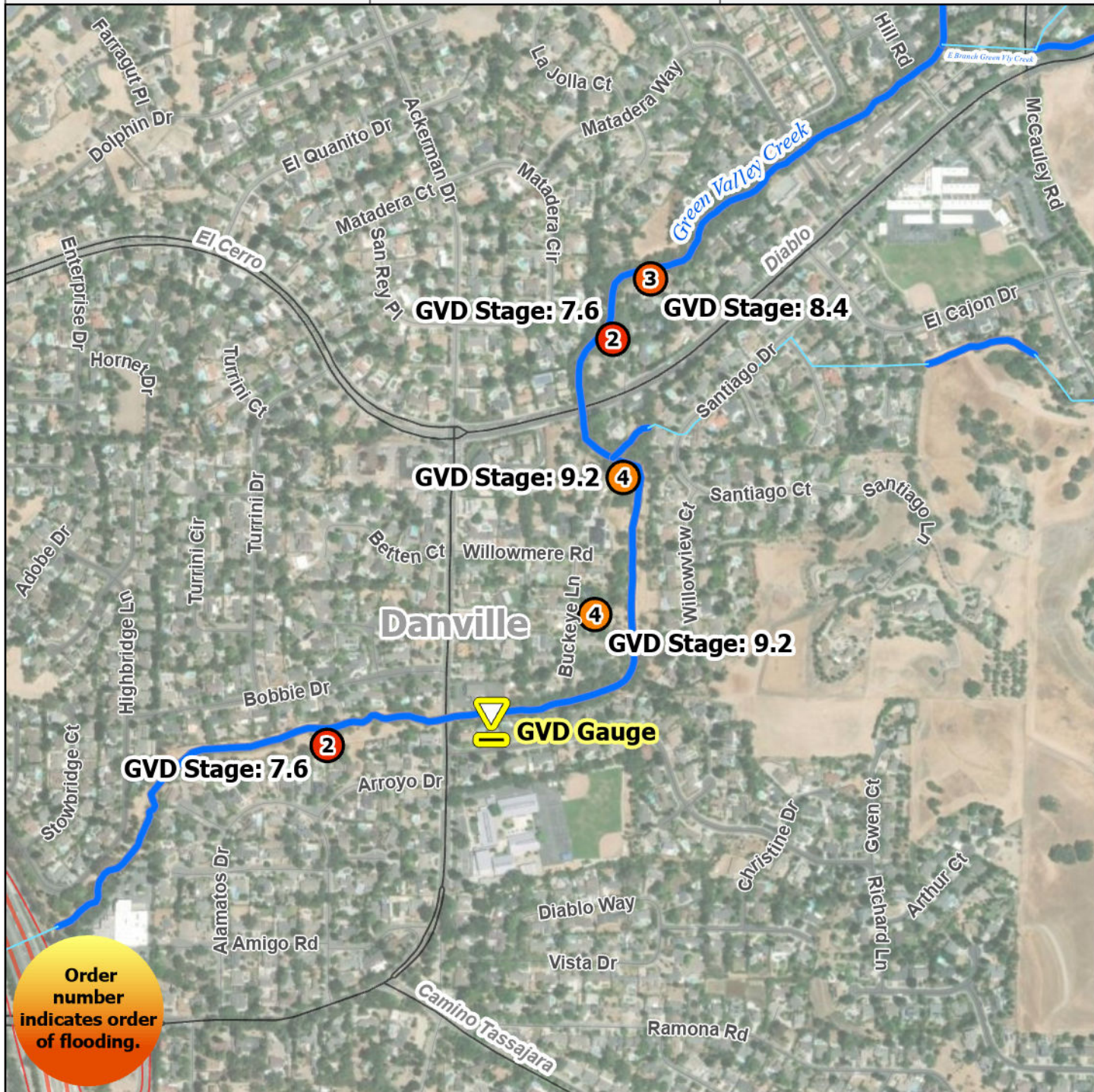


**Contra Costa County
Flood Control
and Water Conservation District**
255 Glacier Drive
Martinez, CA 94553
(925) 313-2000

Flood Stages

Green Valley Creek @ Diablo Road (GVD)

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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

- Flood Location and Order
- Order of Flood Stage



- Creeks
- Underground Creeks

1:8000

0 405 810
Feet



Pg 1 of 2 GVD

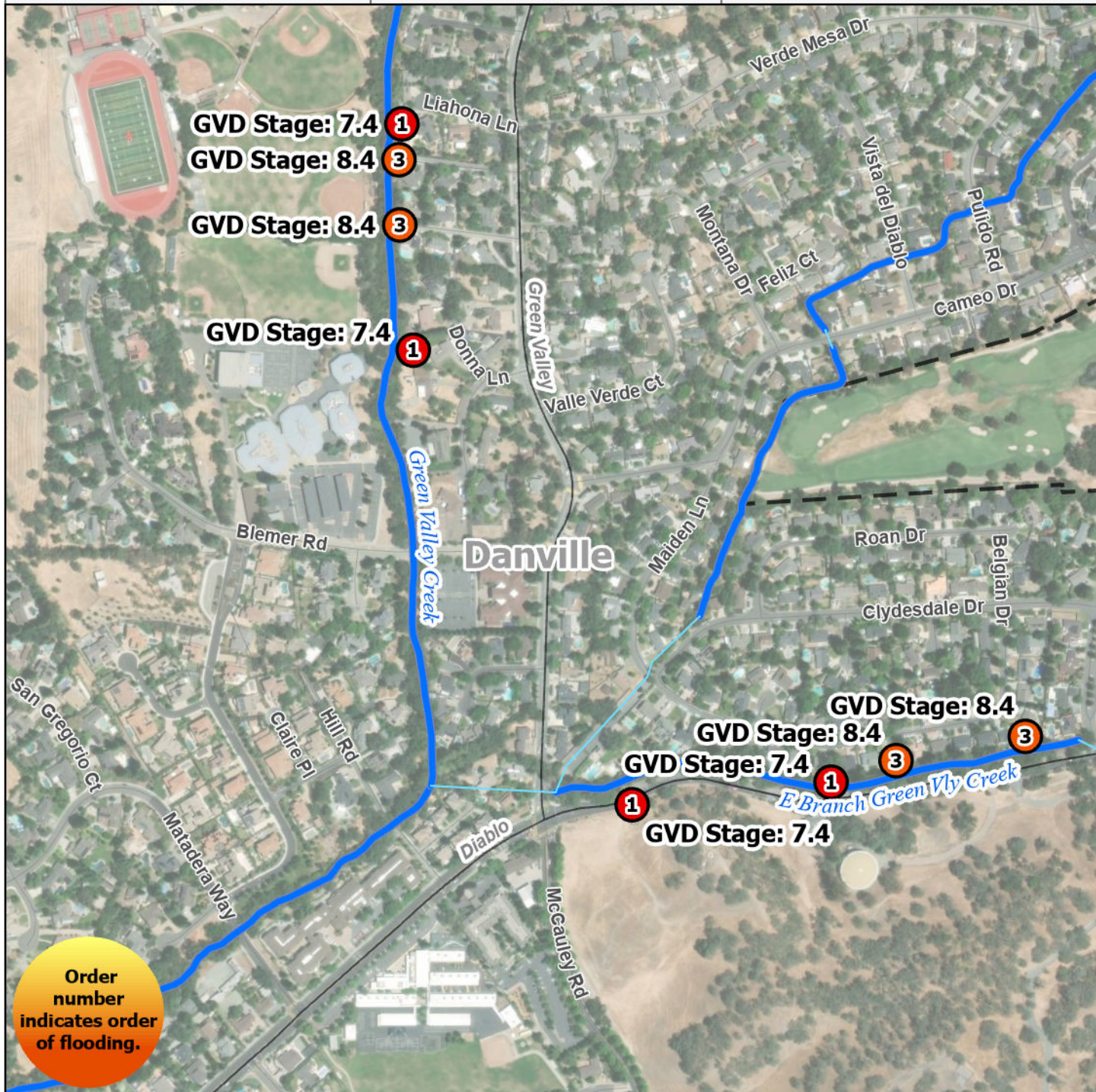


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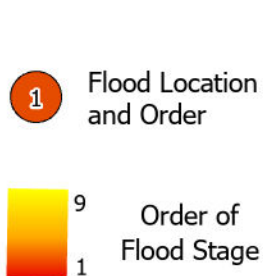
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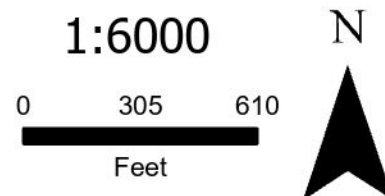
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Creeks

Creeks

Underground Creeks



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