



## Summertime Flows Information

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Updated April 4, 2018

Engineers and contractors frequently ask about obtaining summertime flows in local creeks. They need this information mainly for construction site water control plans. The Contra Costa County Public Works Department (County) and the Contra Costa County Flood Control and Water Conservation District (FC District) hesitate to giving out specific summertime flow rates for several reasons.

1. The FC District doesn't collect summertime flow data specifically for water control plans and has not performed any studies or established any findings along those lines.
2. There are only a few stream gauges in Contra Costa County from which to collect and analyze summertime flows data.
3. The gauges are so few that their recorded summertime flows do not always have watersheds with the same land development characteristics as the most construction sites.
4. There is a possible liability connected with giving out an estimate of summertime flows.



There is always a risk when anyone estimates summertime flows. The data from the retired and existing stream gauges should give a little more certainty, but that will not be a 100% guarantee of what will happen on any given day of construction. Construction losses could be realized if the estimated summertime design flow is too low. Additional project costs can be incurred if the estimated summertime design flow is too high and the water control plan is over designed.

**The County and the FC District (Agencies) cannot guarantee that the following information about estimating summertime flows is complete and appropriate for adequately estimating summertime flows for any specific construction site.**

**Therefore:**

- *The reader will use the following information, and any resulting water control plan design flow rates, at his or her own risk.*
- *Anyone developing or constructing a water control plan using estimated summertime flows developed from the information below assumes all risk and liability if the water control plan is not adequately sized to avoid or prevent flooding of the worksite and causes damages, losses, fine, or other costs.*

## Summertime Flow Considerations

Several things can cause anomalies in the summertime flows:

- In early the summer, the low flows in the creek could be affected by groundwater seeping into the creeks (base flows).
- Unseasonal rains could influence the flows at any time. Contra Costa County has occasionally experienced intense mid-summer rain showers.
- If the watershed is small, runoff from golf course irrigation can be a significant source of flows at specific times of the day during the summer
- A waterline break or fire hydrant flush may create a spike in the flows.

These anomalies may be represented in the stream flow data if the record is long enough, but there is no guarantee of this.

## USGS Gauges in Contra Costa County

Stream flow information from the U.S. Geological Survey (USGS) is available on-line. There is one existing USGS stream gauge in the county that the USGS provides flows for on-line. This is the San Ramon at San Ramon stream gauge. The Marsh Creek USGS gauge was given over to the FC District in 2014, and we collect level data for now. We do not convert that to flow via a rating curve yet and do not publish statistics for the gauge.

There are other USGS stream gauge sites in Contra Costa County that are no longer in service, but USGS still has their data online. Since land development has occurred over time, recorded flows from decades ago might understate what occurs now.

The data for USGS stream gauges that have operated in Contra Costa County can be accessed at:

[http://waterdata.usgs.gov/ca/nwis/dvstat?referred\\_module=sw&county\\_cd=06013&site\\_tp\\_cd=ST&index\\_pmcode\\_00060=1&format=station\\_list&sort\\_key=site\\_no&group\\_key=NONE&list\\_of\\_search\\_criteria=county\\_cd%2Csite\\_tp\\_cd%2Crealtime\\_parameter\\_selection](http://waterdata.usgs.gov/ca/nwis/dvstat?referred_module=sw&county_cd=06013&site_tp_cd=ST&index_pmcode_00060=1&format=station_list&sort_key=site_no&group_key=NONE&list_of_search_criteria=county_cd%2Csite_tp_cd%2Crealtime_parameter_selection)

To see the statistics, click the “Site Number” for the gauge, check the box for “Discharge”, choose the output format such as “Table” and “Maximum” [of daily mean value for each day]. You have the option of viewing the table on-line or having a text file downloaded. Click submit.

Below are links directly to the USGS maximum daily statistics for some of the USGS stream gauges in Contra Costa County. When you view the data, take note of the range of dates. You will want to use gauges that have long periods of record.



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Pine Creek @ Concord, CA	<a href="https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11184500&amp;por=11184500_9105=2208399,00060,9105,1952-10-01,1960-09-29&amp;format=html%20table&amp;stat_cds=max%20va&amp;date_format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted_form=parameter%20selection%20list">https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11184500&amp;por=11184500_9105=2208399,00060,9105,1952-10-01,1960-09-29&amp;format=html table&amp;stat cds=max va&amp;date format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted form=parameter selection list</a>
Wildcat C A Vale Rd @ Richmond, Ca	<a href="https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11181390&amp;por=11181390_9089=2208383,00060,9089,1975-10-01,1996-06-09&amp;format=html%20table&amp;stat_cds=max%20va&amp;date_format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted_form=parameter%20selection%20list">https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11181390&amp;por=11181390_9089=2208383,00060,9089,1975-10-01,1996-06-09&amp;format=html table&amp;stat cds=max va&amp;date format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted form=parameter selection list</a>
San Ramon C @ San Ramon CA	<a href="https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11182500&amp;por=11182500_9098=2208392,00060,9098,1952-10-01,2017-10-11&amp;format=html%20table&amp;stat_cds=max%20va&amp;date_format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted_form=parameter%20selection%20list">https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11182500&amp;por=11182500_9098=2208392,00060,9098,1952-10-01,2017-10-11&amp;format=html table&amp;stat cds=max va&amp;date format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted form=parameter selection list</a>
Arroyo Del Hambre @ Martinez, CA	<a href="https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11182400&amp;por=11182400_9097=2208390,00060,9097,1964-10-01,1982-09-29&amp;format=html%20table&amp;stat_cds=max%20va&amp;date_format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted_form=parameter%20selection%20list">https://waterdata.usgs.gov/ca/nwis/dvstat/?referred_module=sw&amp;site_no=11182400&amp;por=11182400_9097=2208390,00060,9097,1964-10-01,1982-09-29&amp;format=html table&amp;stat cds=max va&amp;date format=YYYY-MM-DD&amp;rdb_compression=file&amp;submitted form=parameter selection list</a>

### New Gauges

The FC District installed a stream gauge on Walnut Creek near Ygnacio Valley Road in the concrete channel section in the summer of 2008. The FC District has not established a rating curve (flow vs. depth curve) for this gauge. Therefore, we and can only provide the depth of flow, not the flow rate.



The FC District also installed a stream gauge on Marsh Creek near the Sheriff's Detention Facility off of Marsh Creek Road in January 2010. We have not established a rating curve for this gauge either.

In 2016 and 2017 we installed 11 new gauges and now operate a total of 13 stream and 2 level gauges in detention basins. The depths measure by these gauges are collected at the FC District office and can be obtained upon request. They can also be obtained via the California Data Exchange Center (CDEC) from links on the FC District webpage at <http://www.cccounty.us/index.aspx?nid=1685> and/or from our RainMap at [www.cccounty.us/RainMap](http://www.cccounty.us/RainMap).

### Other Gauges

There are two of gauges (Wildcat Creek and Alhambra Creek (a.k.a. Arroyo Del Hambre)) were are operated by consultants for cities and we now have our own sensors at those gauge sites. We keep links and information on our stream gauges and other known stream gauge data sources on our website at the link above.

### Estimating Summertime Runoff

One possible approach to estimating summertime flows is to review the daily maximums flow in the creek during the construction window several years before construction, remove the few "outlier" storms from the analysis and use the rest to estimate the highest

flow that might occur. This would possibly give a conservative, but not overly conservative design flow rate for summer time flows.

The San Ramon Gauge could give a good sense of runoff from an un-urbanized watershed and has a long history (installed 1953). However, that creek flows out of a small steep watershed and may not reflect the larger flatter watersheds elsewhere.

The Brentwood and Walnut Creek gauges might give a good sense of the influence of urban irrigation runoff. The Brentwood gauge was installed relatively recently (2000) and taken over by the FC District in 2014. Because the watershed upstream of the Brentwood gauge is continuing to develop, one can expect flows to get higher over time. Its watershed is also highly altered by urban drainage detention basins and the Marsh Creek Dam.

If considering a construction site location a significant distance from one of the gauges, one can prorate the flows using the watershed area. This is not an exact method, but it could give a ballpark flow rate.

The estimated summer time flow rate can be converted into a flow depth for the creek or channel and someone could observe flows the summer before construction to see if that flow depth is common or ask people living around the creek how deep it gets. Vegetation in the channel may be an indicator of how deep the water gets on a regular (weekly) basis during the summer.



A fluvial geomorphologist could be hired to ascertain the summertime flow depth.

## Summary

There is no standard for estimating summertime flows for designing construction site water control plans in Contra Costa County. The Agencies are reluctant to provide specific summertime flows for liability reasons.

Stream gauge records may provide a basis for estimating flows that could be experienced in at a construction site. Personal observation or professional judgment of a fluvial geomorphologist may also provide a basis for confidence in the water control plan design.