

COMMENTS ON FIVE FACTORS RE SUNOL FLOODING

for 2/18/24 Sunol mtg. krh

Sunol sits on the last mile of the west bank of the Arroyo de la Laguna before it joins Alameda Creek. Storm water flood runoff from the 420 sq mi watershed north of Sunol is constrained, it cannot escape fast enough, it backs up and created the Livermore Valley. Now these floodwater back-ups still cause Valley flooding.

However Sunol is below that constraint. It floods from entirely different causes, and for different reasons. In that last mile, storm runoff from four watersheds join in back of the School. So it is not surprising that it is tricky, not easy, to determine the source and causes of the floodwater that flooded (1-4 feet deep) Sunol School on Dec 31, 2022. Importantly, when planning on how to prevent flooding, a big consideration, re fix costs, is the cause of the flooding. And it is not surprising that Sunol is seeking affordable fixes to prevent future flooding.

Below, for tonight's meeting, are some preliminary comments on five key factors re Sunol flood water levels and flood prevention.

1 Flood water levels considering channel hydraulics. Channel flood water heights depend on what we call channel hydraulics; namely the channel cross section area, slope, and roughness factor (we call 'n'). — — — One cause of Sunol flooding is when Arroyo de la Laguna water levels are higher than its west bank in back of the School. Another cause is because all 3 channels (Arroyo de la Laguna, Sinbad, Vallecitos) meet in back of the school, water levels in any one alone could cause flooding. Still another is when water levels in AdIL are higher than levels in SC & VC, thus causing all 3 water levels to rise a little in back of the School. — — Lastly, Alameda Creek is much lower than Sunol, but if its flood water levels are high enough, it could/would cause AdIL water levels to back up and rise at the School. This is why modeling the School flooding is tricky. — — Why? Of **interest** in this respect is that CalTrans in their memo says their model shows that it was backup water from Alameda Creek, not from the debris in front of the Hwy 84 bridge, that caused, or increased, the Dec 31 Sunol flooding.

2 Flood water level frequency considering flood rainstorms. Arroyo de la Laguna flooding frequency at Sunol normally depends on runoff from the daily and hourly storm rainfall intensities during one of the 2-4 day long big rainstorms we normally have in our small watershed. Flood control planners proposing reservoirs to prevent flooding (like US ACOE did after the 1955 flood, when they designed Del Valle Reservoir to prevent AdIL flooding) normally use historic rainfall-runoff data. Normally. — — — However, climate change has

significantly changed the frequency of '*normal* size flood runoff'. Flood engineer studies worldwide, and newspaper articles, all talk about current floods as being "one in 10,000, 1,000, 500 years, biggest ever" etc. etc. For example, the Dec 31, 2022 AdL flood was largely caused by an unexpected 1 in about 400 year (old normal) 5.5" /day rainfall in Dublin. Which caused a ~1:100 yr flood event at Sunol based on historic values. — — As an old reservoir planner at Dept. of Water Resources, the DWR State Climatologist convinced me several years ago that, YES, the biggest ever state 1860s flood could now *normally* happen 2 or 3 times more frequently than we previously thought. Sunol can expect to have a Dec 31 size flood much more frequently. Further, **concerningly**, the CalTrans memo on the Dec 31 flood said School flooding started when Arroyo de la Laguna flows were only about 7,000 cfs, much lower than the peak ~18,000 cfs flow that day.

3 Water levels from models. The models CalTrans and Zone 7 use are excellent. But only when the input values are correct, and the model is verified for flood level flows. I have been unable to review them. Considering the hydraulic complexity explained above they need to be reviewed before concluding the CalTrans memo explanations are right. Only a 1' or 2' water level error makes a huge difference in Sunol flood prevention costs. Note, the cheapest fix may be one that requires some additional work when CalTrans rebuilds the bridge in next 3 years. Hence the need for the quickie *Sunol School Flood Prevention Study* that is being talked about, and is easy to do.

4 Prevention fixes. There are a number of ways to prevent the Sunol School from flooding either the classrooms &/or the play grounds. Because of the cost, the fix depends on the flood frequency and size. (Size defined by water depths from different flow cfs size in the 3 channels, &/or from water backing up from Alameda Creek.). The low cost way described in the CalTrans memo may well be the best way for small and even medium size floods.

5. Financing. Every flood control study starts with investigating fix payment sources. Here they include: the annual County flood tax being paid, annual payments on a Bond issued, federal FEMA grant, and even possibly State sources. Any professional flood engineering consulting company will know about getting these funds. Flood Control Planners carefully identify fix ways, but don't waste time on unfundable ones.

In conclusion. If the cheapest way to fix the flooding problem requires some construction changes during the bridge reconstruction, then a quickie study is needed.