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**SONOMA COUNTY
WATER AGENCY**

March 18, 1988

FILE: 1-4-25 Laguna Study Comm.

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SUBJECT: LAGUNA ADVISORY COMMITTEE REPORT TO THE CITY OF
SEBASTOPOL, JANUARY 1988

Per your request by letter of March 18, 1988 we have reviewed the subject report in general and more specifically, the second paragraph under "Conclusions and recommendations" on page 32. That paragraph makes comment about loss of Laguna storage by filling, the 1986 flood, increased runoff due to land development, and future flood elevation.

With regard to filling, the paragraph is correct in stating that fill will reduce available storage for flood water. Local policy of agencies with territory in the Laguna generally requires no net loss of storage if fill is placed in the Laguna. That policy would require that a cubic foot of earth be excavated from the Laguna for each cubic foot placed in the Laguna. There is the implication that this policy will stop loss of storage space in the Laguna. There are other natural and man-made causes of storage loss. There is a certain amount of natural erosion in the upland watersheds that causes sedimentation and loss of storage in the Laguna. This natural erosion is added to by many land use activities in the watershed. Agricultural activities such as tilled orchards and vineyards, overgrazing and road building, increase erosion from the land with subsequent siltation downstream. However, the agricultural construction of ponds and reservoirs tends to reduce total downstream agriculture-caused siltation by trapping silt in the reservoirs. Land development and other earthmoving construction activities expose the soil to storm runoff, causing short term erosion conditions. It is interesting to note that the long term land that has been urbanized has a low level of erosion, as the land is capped with buildings, roads, parking areas, turf and other land use that reduces the amount of silt reaching downstream points. A significant amount of erosion material is being retained in five flood control reservoirs constructed by the Water Agency as part of the Central Sonoma Watershed Project.

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The total erosion and sedimentation impacts on Laguna storage are complex and are not fully covered above. This would require attention and thorough evaluation by professionals qualified in the study of erosion, sediment transport in flowing water, sedimentation in reservoirs and related fields of knowledge.

The 1986 flood was the result of a storm which released rainfall at greater than normally expected intensity on the lower Russian River watershed than on the upper watershed. This caused a flood event which was substantially different than any flood event in the record of about 100 years. A flood of the 1986 type may not happen again for hundreds or thousands of years or it may happen again in less than 100 years. All that can be said with certainty, is that it is the only flood of its kind in the last 100 years of record.

In all major past floods, the Russian River would rise to an elevation above the flood water elevation caused by local storm water runoff in the Laguna. Under those conditions, part of the river flood water would enter the Laguna. That transfer of water to the Laguna would cause the Laguna to rise and would reduce the level of flooding in downstream reaches of the Russian River.

The 1986 flood changed the historical interaction of Russian River flood water and Laguna flood water. While that fact is informative and interesting, it does not materially change the importance of the natural flood reduction effect of the Laguna. Whether the flood water that is stored is partly Russian River water or all water from local watersheds that drain to the Laguna, the Laguna has a significant and effective role in reducing the level of flooding that would occur if the flood storage now available in the Laguna was not there or was reduced significantly.

With regard to increased runoff due to land development, a popular rule of thumb holds that runoff from land that is developed will double. As a generalization this can be used to evaluate the effect of land development at downstream points. Some land is developed to shopping centers with more than double runoff. Other land in urban area is used as school grounds, parks and other uses that leave pervious soil exposed for percolation of rain water.

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The watersheds draining into the Laguna cover an area of 255 square miles. About 50 square miles are urban or have urban characteristics. That includes the sum of all urbanization that has occurred at any time in the past. Using the double runoff rule of thumb this indicates that runoff has approximately doubled on about 20% of the Laguna watershed from urban sources. As mentioned above regarding erosion, land use changes on much of the remaining 80% has also affected runoff. Again, the tilled dry farming of orchards and vineyards and overgrazing of upland areas causes increased runoff. There are no known estimates of what the increase might be. The increase would probably be less than double but the area involved is much larger than the 20% urban part of the watershed. Again, the agricultural users have also reduced runoff by construction of ponds and reservoirs. The construction of roads and freeways have also contributed to some increased runoff and in some cases reduced runoff. The five Water Agency flood control reservoirs, mentioned above have caused a substantial peak runoff reduction to the Laguna. The above items discussed are not an exhaustive list of land use and construction that affects runoff to the Laguna. It is sufficient, however, to demonstrate that the issue of cause and effect as to what and who changes runoff to the Laguna is a very complex matter.

Future flood elevations are almost certain to rise. The rate of change and the cause of change are not easily defined. One cause of change which has always been in action is the natural filling of the Laguna by erosion in the upper watershed which creates sediment that is carried to the Laguna by flood water. Additional sediment is added to the natural erosion by certain land uses described above. Some of the fine sediment remains in suspension and is carried through the Laguna to the Russian River. The heavier and larger sediment particles settle out of the water as it slowly makes its way to the Russian River. Because of these deposits in the bottom of the Laguna, flood storage will be lost gradually over time. If filling of the Laguna is allowed, the rate of storage loss will increase. There have been no known studies of a rigorous technical nature which would allow a prediction as to how high flood levels will get and when those levels will occur. However, the rate of storage loss is not rapid. It is a relatively slow cumulative process.

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In general the report expresses concern about matters which are not easily answered without more thorough analysis, taking into account all contributing factors in the watershed which affect Laguna flood storage, the 1986 flood, increased and decreased runoff due to all watershed activities, and future flood elevations in the Laguna.


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