The Great Sorrento Valley Flood
not a question of if but when

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The Sorrento Valley is at risk of flooding from even minor storms. More severe storms will cause extensive damage. FEMA flood potential maps make this clear - but under-estimate the problem. Urbanization has increased impervious surfaces in these watersheds and will lead to faster flood peaks and larger floods.[1] As urbanization progresses, water flows will be much larger than historic levels. Anyone in this area should carry flood insurance.

Sorrento flooding 2017

Predicting floods is difficult because we have a very limited record of past flows in most creeks and a relatively short period of record. Most flooding events are regional,[2] but some are highly local. The 1889 event in Encinitas was a dramatic illustration of this with almost an inch and hour for 8 hours. In this kind of storm severe flooding will occur. Water flow is usually described in cubic feet per second (cfs). Each is about 8 gallons.

Flooding in Sorrento Valley[3]

1780 major flood
1811
1821
1825 major flood
1861-62 a flood "of biblical proportions" flow reached an estimated 94,500 cfs in the San Diego River at Santee, widespread destruction
1867
1869
1874
1884 The flat at Cordero (a train stop in Sorrento Valley) was entirely submerged. At Cordero two huge landslides triggered by the rain covered the railroad tracks and they had to be dug out, but new slides occurred almost as fast as the others were cleared away. Fifty inches of rain fell in Escondido that year.
1889 a remarkable 7.6 inches of rain fell in 8 hours at Encinitas
1891 Rain started on February 19 and continued for a solid week: 30 inches in 37 hours in Escondido.
1895 One observer considered this flood greater than the 1884 flood
1904
1906
1910
1914
1916 No data for Sorrento Creek but the San Diego River flow was estimated at 70,200 cfs.

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[1] one study of Penasquitos watershed suggests 3.5 to 7 times more frequent flood flows

[2] The following list of regional floods would probably have impacted Sorrento Creek

[3]formerly called Soledad Canyon, early settlements included Soledad, Rheba, and Cordero

1921 San Diego River 16,700 cfs at Santee
1927 the heaviest rainfall since January 1916, flood flow 45,000 cfs in the San Diego River
1932 San Diego River, 7,400 cfs
1937 San Diego River 14,200 cfs at Santee
1938 San Dieguito river 4,380 cfs
1941 San Diego River 9,250 cfs
1943 the Corps of Engineers used this March 3, 4 flood as a base for flood studies in their 1967 report on flood risk.
1946
1953
1966
1968
1978
1979
1980 Mission Valley flooding from San Diego river flow at just 3,420 cfs at Santee
1981
1983 9,590 cfs for San Diego River
1996 Sorrento flooding in November
1997 Less than 1 inch of rain caused Roselle Street to flood with two feet of water
1998 San Diego river 7,090 cfs
2010 The railroad tracks in the valley were submerged for more than a week (tracks then raised to suggested 50 year flood), San Diego River flood flow 9,400 cfs
2016 Sorrento valley area flooded
2017 flooded, San Diego river 9,810 cfs.
2018 flooded, San Diego river just 801 cfs
2019 flooded San Diego River ~6,500 cfs

The maximum flood potential for Sorrento Creek was estimated at 23,000 cfs in the Integrated Regional Watershed Management report in 2013. This is likely an underestimate if we consider the historical flood events. Climate change and urbanization may make it much worse, perhaps 30,000 cfs - more than 15 times the channel capacity. The area where Interstate 5 crosses the creek offers a clear example of the problem. The estimated channel capacity of the concrete channel south of the road crossing (Reach 3) is just 1,900 cfs[4] if it is clear of vegetation and sediment. It may be only half that when clogged. The 10 year return flood is optimistically projected at 1,500 cfs and could cause flooding when the channel is not clear, and perhaps some flooding even when it is clear.

Sorrento Creek at the crossing in 2015

The channel sediment and vegetation should be cleared as needed, perhaps every 3 years. This is costly and realistically, will not be done. In 1997 the city removed 67,000 cubic yards from the Sorrento Valley area stream channels. Additional material was removed in

[4] In 1959, when the Town and Country Hotel was built in Mission Valley the channel capacity was reduced to only a few thousand cfs with a potential flood of 40-80,000 cfs.

Sorrento Creek south of bridge crossing 2019

2010. In 2014 the city took out 2-4,000 cubic yards of material from Reach 3. More material was removed in March 2015 and the channel was clear.

This problem is not unique to Sorrento Valley, many other vallers are at risk — including Mission Valley. These problems will not get better by themselves. Mistakes were built in by planning that ignored history and the impact of urbanization on stream flow.[5] The best that can be done is to educate those at risk, to encourage them to buy flood insurance, to ensure the city maintains the channels, and to gradually work to reduce runoff from the area watersheds with rainwater retention features to minimize flood peaks.

The objectives of this effort should be to:

1. Minimize costs to the public and to private land and property owners.
2. Protect and enhance hydrologic function and minimize flooding and erosion in the watersheds that feed Sorrento Valley.
3. Protect and enhance water quality (in stream and in the Penasquitos lagoon).
4. Maintain the economic value of areas at risk.
5. Protect and enhance waterways as recreational areas for people, and as habitat

[5] Well described by Luna Leopold in the 1960s

and corridors for fish, birds, mammals and other wildlife.
6. Enhance and protect natural and open space features for biodiversity.
7. Provide educational guidance with demonstration projects, web resources and signage. Pervious pavers, rainwater harvesting, cisterns, swales and infiltration basins.
8. Protect cultural and archaeological resources. Ystaguay village in the valley.
9. Maintain and enhance aesthetic qualities.
10. Avoid similar problems in future development!!

Stream channel maintenance can save money, reduce losses to property owners and insurers and reduce litigation. Improvements in stormwater management at the watershed level can be cost effective. In Tucson, AZ studies suggest they would have a significant impact on both large and small storm events, reducing the 100-year 3-hour event peaks by 24%, 19% and 10% in the Valencia, El Vado, and Santa Clara watersheds respectively. Stormwater management implemented throughout these watersheds in their 25-year scenario would result in over $2.5 million dollars of annual community benefits as a result of flood reductions, water conservation, property value increases, reduced urban heat island impacts, improved stormwater quality, reduced heating and cooling needs, air quality improvements, and the energy associated with pumping water and groundwater in Tucson.[6]

Further reading:

Leopold, Luna B. 1968. *Hydrology for Urban Land Planning —A Guidebook on the Hydrologic Effects of Urban Land Use*, U.S. Geological Survey Circular 554, 18p https://eps.berkeley.edu/people/lunaleopold/(104)%20Hydrology%20for%20Urban%20Land%20Planning%20-%20A%20Guidebook%20on%20the%20Hydrologic%20Effects%20of%20Urban%20Land%20Use.pdf

Kloss, Chris. 2008. *Managing Wet Weather with Green Infrastructure: Municipal Handbook of Water Harvesting Policies*. EPA. https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_harvesting.pdf

Lancaster, Brad. 2019. *Rainwater Harvesting for Drylands and Beyond*. https://www.harvestingrainwater.com/street-runoff-harvesting/

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[6] Watershed Management Group. 2015. Solving Flooding Challenges with Green Stormwater Infrastructure in the Airport Wash Area. https://watershedmg.org/sites/default/files/documents/solving-flooding-challenges-with-green-stormwater-infrastructure-in-tucsons-airport-wash-2015.pdf