

Supplemental Material

Journal of Hydrometeorology The Nonstationary Flood Hydrology of an Urbanizing Arid Watershed https://doi.org/10.1175/JHM-D-22-0117.1

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Fig. S1. Annual unit flood peaks and their fitted lines using non-parametric Theil-Sen estimators for nine USGS streamflow gages across the watershed. The location of these streamflow gages is shown in Fig. 1a in the manuscript.



Fig. S2. Changes in land use for Las Vegas Wash watershed from 1950 to 2019. The 1950 land use data is from USGS modeled data, whereas the 2019 land use data is from National Land Cover Database.



Fig. S3. (a) The location of detention basins within the Las Vegas Wash watershed. The largest one, Kyle Canyon detention basin, is highlighted in red. (b) Photo of the Kyle Canyon detention basin. Photo courtesy of the Clark County Regional Flood Control District.



Fig. S4. Satellite images from 1984 and 2020 show urban growth on alluvial fans in Las Vegas.



Fig. S5. (a) Maximum storage percentage of detention basins since their installation. (b) The corresponding estimated outflow using the rating curves. Basins that have no available rating curves are not shown in (b).



Fig. S6. Box plots for annual peak flows for nine USGS gages within the Las Vegas Wash watershed.



Fig. S7. Inland penetrating atmospheric rivers (a and c) and their associated daily rainfall (b and d) over the Las Vegas Wash watershed for February 1980 and December 2004 events.



Fig. S8. The spatial distribution of composite daily rainfalls that caused the (a) winter and (b) summer floods during the 1957-2020 period. The mean daily rainfall (P_{mean}) and peak flows (Q_{mean}) are shown. Green line denotes the main river channels. Elevation contours are shown with 500 m intervals.

Table S1	. Characteri	istics of urb	anization	for each	subwater	shed.	The o	develo	ped lar	nd per	centage
is from 20	019 Nation	al Land Co	ver Data s	set; the	detention	basin	and t	flood	convey	ance	systems
data are fi	om Clark (County Reg	ional Floo	d Contro	ol District	: (2020)).				

Gages	Developed land [%]	Total volume of detention basins [km ³]	Total length of flood
09/197/0	12	2 7	29 9
0)41)/40	72	2.1	2).)
09419680	0	0	0
09419665	29	1.8	76.1
09419696	49	7.6	185.9
094196781	32	9.1	206.8
09419650	13	17.5	317.2
09419658	18	18.9	421.4
09419700	24	48.7	1057.7
09419753	24	48.7	1120.7