

Overview of Recent Rainfall Events and Flood Levels on Toms Creek

Following heavy rainfall during December 23 and December 30, 2015, many areas in Carrboro experienced flooding. One of the hardest hit areas was Tom's Creek between Rainbow Drive and West Main Street. Flooding problems along Toms Creek have been observed and well documented over the past 35 years. Alternatives to mitigate the flooding problem have been studied extensively by private engineers as well as the US Army Corp of Engineers since the early 1980's.

Since there are no continuously monitored rain gages in the Tom's Creek drainage basin or stream gages on Tom's Creek, no direct comparison could be established between storm event and flooding frequency. In an effort to provide a comparison between the latest December storms and historical storm events, available gage data information was obtained from streams in relative proximity to Tom's Creek. Two USGS gage stations were found; one on Morgan Creek near Chapel Hill (020973444) and one on Bolin Creek at Village Drive (020973444). These gage stations continuously record water levels which are used to calculate the stream flow or discharge. Stage-discharge relationships are then established for each gaged stream. The Morgan Creek gage had 32 years of data while the Bolin Creek gage has only 3 years of data.

Since the Bolin Creek gage had a relatively short recording period it was impossible to relate the recent storm events to extended historical flooding; however the following relationships could be extrapolated:

DATE	GAGE HEIGHT	DISCHARGE	RAINFALL *
6/30/13	8.9'	2910 cfs	5.1"
5/15/14	5.9'	869 cfs	4.6"
12/23/15	6.4'	941 cfs	2.4"
12/30/15	7.1'	1330 cfs	2.5"

*Rainfall information shown in the preceding table was obtained from the rain gage at Horace Williams Airport in Chapel Hill, NC.

The Morgan Creek station is located on Morgan Creek approximately 5.7 miles downstream from the confluence with Tom's Creek. The drainage area at the station is 41 square miles. Since the Morgan Creek gage station had been in operation for a longer period of time, it provided a more in depth look at the historical perspective of the December flooding than the Bolin Creek gage. In addition to the daily peak gage heights and discharges, the gage had been in service long enough that flood frequency statistics could be established for that location on Morgan Creek. These statistics include stormwater discharges for the 2-year through the 500-year storms which enable a correlation to be made regarding estimated frequencies of different flood events in the Toms Creek basin. Following is the gage information for selected storms:

DATE	GAGE HEIGHT	DISCHARGE	RAINFALL *	FREQUENCY
8/28/95 T.S Jerry	11.8'	1830 cfs	5.5"	>2-Year
2/06/10	12.6'	2110 cfs	1.9"	>2-Year
12/23/15	13.1'	2370 cfs	2.4"	<5-Year
12/30/15	13.6'	2610 cfs	2.5"	5-Year
6/30/13	13.8'	2720 cfs	2.4"	>5-Year
9/06/08	14.1	2880 cfs	4.5"	>5-Year
3/20/03	15.2	3550 cfs	2.2"	>10-Year
9/06/96 Hur. Fran	16.2	4210 cfs	8.8"	<50-Year

*Rainfall information shown in the preceding table obtained from rain gages at Horace Williams Airport in Chapel Hill, NC and RDU International Airport in Raleigh, NC.

Attached is a graph showing historical flooding events and associated frequencies on Morgan Creek.