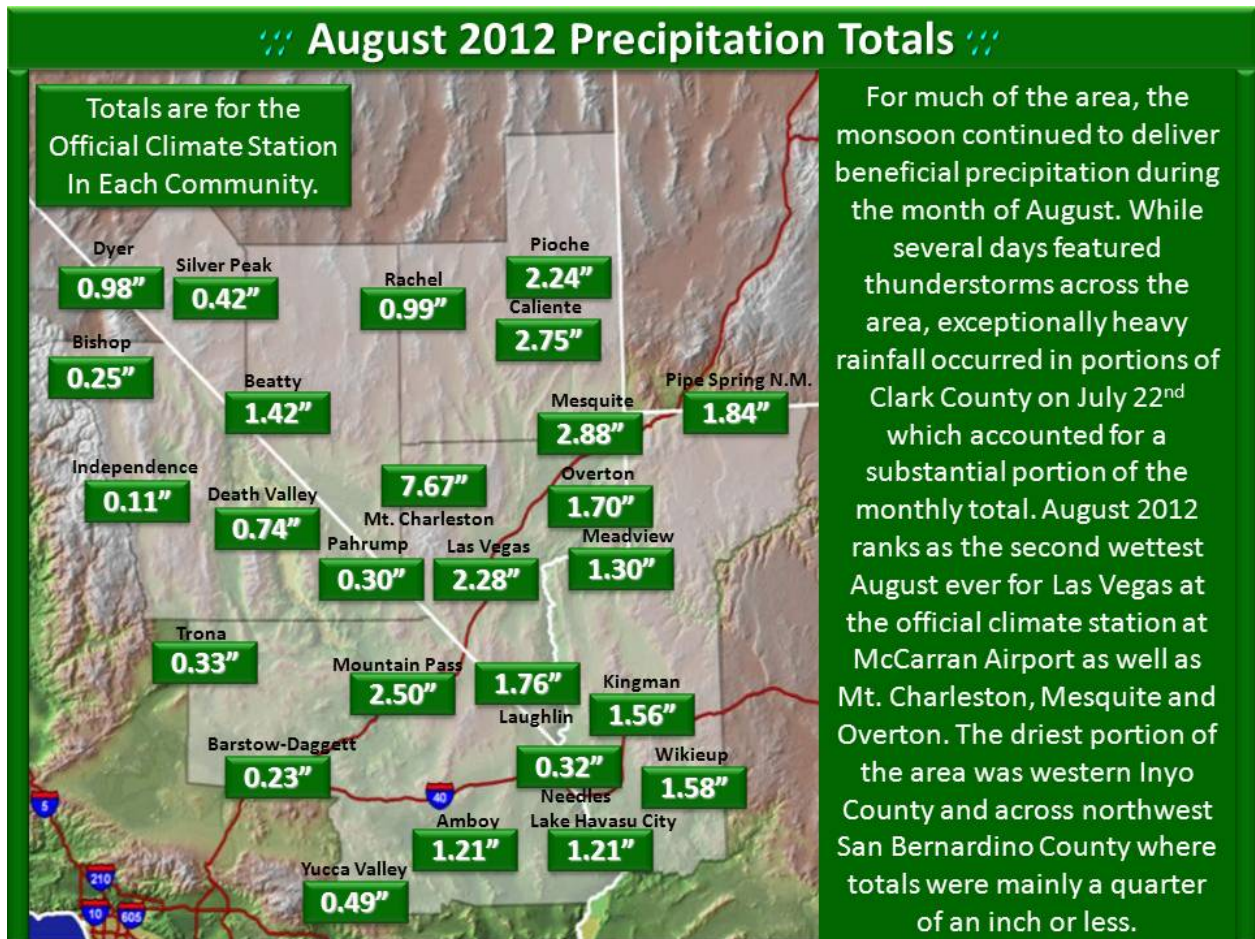


# Rainfall & Flood Event Report

## August 21-22, 2012

prepared by  
 Timothy E. Sutko  
 Environmental Mitigation Manager  
 Clark County Regional Flood Control District

The 2012 summer monsoon was very active and August 2012 was unusually wet throughout Clark County according to the National Weather Service (NWS). The NWS, which began keeping records of the Las Vegas weather in 1937, has reported that the 2.28 inches of rainfall measured at the official gage located at McCarran International Airport makes August 2012 the second wettest August on record. Normal monthly precipitation for August is 0.33 inches. A total of 12 thunderstorm days were also recorded in Las Vegas (normal is 3.3 days), tying this month with August 1955 for the highest number of thunderstorm days for any month. Other official climate stations through Clark County and southern Nevada also measured abnormally large amounts of rainfall as presented in the figure below.



The NWS recorded 1.65 inches of rainfall from the thunderstorms that moved across the southern part of the Las Vegas Valley in the mid-morning hours of August 22. This was the second highest calendar day total ever measured by the local NWS office. These storms produced significant runoff and numerous instances of flooding of streets and low lying areas, particularly in the southeast quadrant of the Las Vegas Valley. Damage to public and private properties was limited as flood control facilities functioned as designed. One death was associated with this event when a young man apparently fell into the Pittman Wash near Sunset Road and was swept several miles downstream.

Exceptionally high atmospheric moisture was in place throughout Clark County for several days preceding August 22. Dewpoint temperatures consistently exceeded 55 degrees as early as August 17<sup>th</sup>, and exceeded 70 degrees in some locations on August 21-22. The National Weather Service (NWS) recognized the potential for severe rainfall and flash flooding and initiated a series of telephone conference calls and informational briefings with local emergency responders. The first call of this nature was on August 17 and additional briefings were conducted on August 21-22. Given the concern that an upper level disturbance moving into the area from the west, combined with the abundant moisture that was already in place, would trigger severe rainfall, the local office of the NWS issued a Flash Flood Warning on August 21 for the following day. (A copy of the NWS *Preliminary Summary of the August 22, 2012 Las Vegas Heavy Rain and Flash Flood Event* which includes a discussion of the atmospheric conditions is attached to this report)

Moderate to heavy rainfall in the Clark County area began in the late evening hours on August 21 as thunderstorms moved into and north of Mesquite. Over approximately a five hour period, 13 Regional Flood Control District Flood Threat Recognition System (FTRS) rain gages in the Mesquite area reported more than 1.5 inches of rainfall; 10 of those gages reported more than 2 inches of rainfall during that period. Tables 1 and 2 present representative rainfall data collected by FTRS gages for this event. Figures 1-8 present the 24-hour rainfall totals throughout Clark County as reported by the FTRS.

Runoff from this storm system was captured and slowly released by the three detention basins north of I-15 (Town Wash, Abbott Wash and Pulsipher Wash). Each of these detention basins functioned as designed and each impounded 6-8 feet of storm runoff. Flood control channels safely conveyed the runoff to the Virgin River. Damages resulting from the rainfall and subsequent runoff were largely limited to erosion of landscaped and unpaved areas. It was reported that one residence was flooded when runoff from a hillside at the back of the property entered the building and caused damage to the flooring and sheet rock. No significant damages to other private or public properties have been reported.

Showers and thunderstorms began moving into the Las Vegas Valley after 6AM on August 22, and intensified and became more numerous after 9AM. The heaviest rainfall occurred after 10AM and continued until around 1PM. While most parts of the Valley saw at least 0.50 inches

of rain, the most rain occurred across the southern part of the Valley. The storm's movement was generally from the southwest to the northeast with the most intense rain cells tracking along and south of St. Rose Parkway and I-215. During this event nine FTRS rain gages reported more than 2 inches of rainfall; a total of 26 FTRS rain gages measured more than 1.5 inches of rain. Tables 3 and 4 present a representative summary of the rainfall data collected by the FTRS gages in the southern part of the Las Vegas Valley for this event.

While the rainfall intensities were generally not impressive, the total volume of rain over a large area resulted in significant runoff in all of the water courses throughout the Valley. Detention basins performed as designed, capturing significant volumes of runoff from upstream areas and releasing the runoff at greatly reduced rates to the facilities downstream (Table 5). The most impressive flows appear to have occurred in Duck Creek and Pittman Wash. Estimates of the flow in the lower reaches of Duck Creek indicate that the peak flow was near the design capacity of that channel. Table 6 presents information on the maximum water depths measured by FTRS gages as well as an estimate of the peak discharges at those locations.

The runoff caused numerous instances of flooded roadways and intersections as the runoff made its way to the flood control channels and storm drains. Several motorists were stranded and needed assistance when their vehicles stalled in the high water. Local public works departments temporarily closed several roads due to flow through low-water crossings and ponded water as well as debris in the roadways.

Damage to private properties was limited. There was no known damage to residences or businesses reported in either Las Vegas or North Las Vegas. In Henderson, flooding of three residences and several businesses has been reported. There were many additional reports of damage to parked cars and landscaping. A church in the vicinity of Bermuda Road and Cactus Avenue suffered several feet of flood waters flowing through the property. It was apparent that piles of dirt, rock and debris that had been informally dumped along Cactus Avenue between Amigo Street and Radcliff Street acted as a dike and diverted storm runoff that otherwise would have entered a gravel pit located on the north side of Cactus Avenue. This diversion may have resulted in the flooding of the church property on the adjacent parcel.

In addition to clean-up of debris from the roadways, there were some limited damages to public properties. Along the Flamingo Wash at Eastern Avenue, a portion of the concrete apron on the upstream approach was displaced and partially blocked flow through three of the five cells under Eastern Avenue. After flow receded, the displaced portion of the apron was tipped back into place as a temporary measure until a more permanent solution could be developed and implemented. Along Duck Creek, flood flows damaged or displaced gabion baskets in several locations, as well as causing the erosion of the channel side slopes in one reach near Nellis Blvd.; however, it is not believed that these damages adversely affected channel performance significantly. Flow in the Pittman Wash near US-95 was at or exceeded channel capacity;

approximately 700 feet of chain-link fencing along the top of the channel walls was ripped out by the flood flows.

Overall, it is apparent that the flood control facilities functioned as designed throughout the area. There were no facility failures or known damages other than those mentioned above. The Pittman Wash Channel as it turns east to pass under Stephanie Street was flowing at maximum capacity during this event and modifications to improve or increase the conveyance capacity may be warranted.

During this flood event, there was one death when a Green Valley High School student was swept downstream by flood flows in Pittman Wash near Sunset Road. Local news media reported that he accidentally fell into the wash after climbing over a wall with friends to observe the flood flows. There were several other instances reported by the local media of others intentionally entering the flood flows in Duck Creek and Pittman Wash.

### **Summary**

The combination of extremely moist air and an upper level disturbance moving into the Clark County area triggered wide-spread heavy rainfall throughout many areas of Clark County. The local office of the National Weather Service accurately forecast the severe weather several days in advance of its occurrence. The NWS communicated well with local governments and emergency responders both before and throughout this event.

Most of the Las Vegas Valley received at least 0.50 inches of rain, with the south Valley experiencing more than 2 inches of rain in many areas. The Mesquite area also saw in excess of 2 inches of rainfall, as did some of the less-populated parts of Clark County. This wide-spread heavy rainfall resulted in significant flows in all of the major washes and channels in the Las Vegas Valley. The downstream reaches of both Duck Creek and Pittman Wash were flowing near design capacities. Damages to both private and public properties were limited. One death occurred when a young man entered Pittman Wash near Sunset Road and was swept downstream.

The Regional Flood Control District's Flood Threat Recognition System functioned well throughout this event, providing accurate and timely data on rainfall and water levels. Post-event verifications of high water marks indicate that accurate data was reported. The calibrations of several tipping bucket rain gages were checked and the equipment was found to be functioning well within tolerances. It is believed that the FTRS data is credible.

**Table 1. Rainfall Summary Mesquite Area 08/21-22/2012. (All units are inches)**

Station ID	2564	2574	2584	2594	2599	2664	2674	2684	2694	2754	2784	3144
08/22/12												
1700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1600	0.12	0.12	0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00
1500	0.08	0.12	0.20	0.20	0.28	0.08	0.28	0.20	0.28	0.24	0.16	0.04
1400	0.00	0.00	0.04	0.08	0.04	0.12	0.00	0.08	0.08	0.12	0.08	0.20
1300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
1200	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.08
1100	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0900	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0800	0.08	0.08	0.04	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.04	0.00
0700	0.31	0.20	0.35	0.28	0.24	0.28	0.28	0.39	0.31	0.28	0.12	0.08
0600	0.43	0.24	0.35	0.39	0.43	0.47	0.35	0.28	0.39	0.39	0.43	0.39
0500	0.16	0.08	0.12	0.04	0.20	0.00	0.00	0.08	0.12	0.08	0.04	0.55
0400	0.20	0.24	0.51	0.51	0.31	0.24	0.47	0.55	0.39	0.12	0.28	0.00
0300	0.28	0.24	0.71	0.75	0.83	0.08	0.91	0.98	0.87	0.28	0.91	0.00
0200	0.12	0.16	0.20	0.12	0.04	0.31	0.08	0.08	0.12	0.16	0.08	0.00
0100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
08/21/12												
2400	0.43	0.24	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
2300	0.63	0.35	0.04	0.00	0.00	0.28	0.04	0.08	0.00	0.00	0.00	0.00
2200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
2100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTALS:</b>	<b>2.87</b>	<b>2.09</b>	<b>2.60</b>	<b>2.44</b>	<b>2.40</b>	<b>2.05</b>	<b>2.48</b>	<b>2.72</b>	<b>2.56</b>	<b>1.73</b>	<b>2.13</b>	<b>2.09</b>

- 2564 Mesquite 1; 9 miles north of Mesquite
- 2574 Mesquite 3; 7 miles north of Mesquite
- 2584 Mesquite Airport
- 2594 Jim Wilson (aka, town Wash) Detention Basin
- 2599 Town Wash Channel
- 2664 Mesquite 2; 11 miles northwest of Mesquite
- 2674 Pulsipher Wash Detention Basin
- 2684 Abbott Wash Detention Basin
- 2694 Abbott Wash Channel
- 2754 Bunkerville; 7 miles south of Mesquite
- 2784 Windmill Wash Detention Basin, Bunkerville
- 3144 California Wash 3; 13 miles SSW of Glendale

**Table 2. Peak Rainfall Intensities (all units are inches)  
August 21-22, 2012  
Mesquite/Bunkerville**

<b><u>Stn ID</u></b>	<b><u>5 min</u></b>	<b><u>10 min</u></b>	<b><u>15 min</u></b>	<b><u>30 min</u></b>	<b><u>1 hr.</u></b>	<b><u>2 hrs.</u></b>	<b><u>3 hrs.</u></b>	<b><u>TOTAL</u></b>
<b>2564</b>	0.20	0.35	0.47	0.87	0.94	1.06	1.06	<b>2.87</b>
<b>2574</b>	0.20	0.35	0.39	0.55	0.55	0.55	0.63	<b>2.09</b>
<b>2584</b>	0.16	0.28	0.31	0.55	1.02	1.38	1.42	<b>2.60</b>
<b>2594</b>	0.12	0.24	0.31	0.55	0.98	1.34	1.34	<b>2.44</b>
<b>2599</b>	0.16	0.24	0.31	0.55	0.79	1.18	1.26	<b>2.00</b>
<b>2664</b>	0.16	0.28	0.35	0.39	0.59	0.67	0.83	<b>2.05</b>
<b>2674</b>	0.08	0.20	0.28	0.51	0.98	1.42	1.46	<b>2.48</b>
<b>2684</b>	0.16	0.31	0.39	0.67	1.18	1.57	1.61	<b>2.72</b>
<b>2694</b>	0.16	0.28	0.35	0.51	0.91	1.30	1.38	<b>2.56</b>
<b>2754</b>	0.12	0.20	0.20	0.39	0.55	0.67	0.75	<b>1.73</b>
<b>2784</b>	0.12	0.28	0.39	0.59	0.91	1.26	1.30	<b>2.13</b>
<b>3144</b>	0.35	0.51	0.55	0.63	0.79	0.91	0.98	<b>2.09</b>

2564 Mesquite 1; 9 miles north of Mesquite  
2574 Mesquite 3; 7 miles north of Mesquite  
2584 Mesquite Airport  
2594 Jim Wilson (aka, town Wash) Detention Basin  
2599 Town Wash Channel  
2664 Mesquite 2; 11 miles northwest of Mesquite  
2674 Pulsipher Wash Detention Basin  
2684 Abbott Wash Detention Basin  
2694 Abbott Wash Channel  
2754 Bunkerville; 7 miles south of Mesquite  
2784 Windmill Wash Detention Basin, Bunkerville  
3144 California Wash 3; 13 miles SSW of Glendale

**Table 3. Rainfall Summary Southern Las Vegas Valley 08/21-22/2012. (All units are inches)**

<b>Stn ID</b>	<b>4099</b>	<b>4544</b>	<b>4619</b>	<b>4644</b>	<b>4704</b>	<b>4714</b>	<b>4719</b>	<b>4724</b>	<b>4734</b>	<b>4759</b>	<b>4769</b>	<b>4774</b>
08/22/12												
1800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1730	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1700	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.00	0.08	0.00	0.04
1630	0.08	0.04	0.04	0.04	0.08	0.04	0.16	0.08	0.08	0.00	0.08	0.04
1600	0.04	0.08	0.04	0.00	0.04	0.04	0.00	0.08	0.04	0.04	0.00	0.04
1530	0.00	0.00	0.04	0.00	0.04	0.12	0.04	0.08	0.08	0.04	0.08	0.08
1500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1430	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1400	0.00	0.04	0.04	0.04	0.00	0.00	0.04	0.00	0.04	0.00	0.00	0.00
1330	0.04	0.00	0.00	0.00	0.12	0.00	0.04	0.08	0.00	0.04	0.04	0.00
1300	0.08	0.12	0.08	0.08	0.00	0.04	0.00	0.00	0.12	0.04	0.04	0.08
1230	0.08	0.04	0.12	0.12	0.04	0.16	0.16	0.16	0.24	0.12	0.12	0.04
1200	0.31	0.71	0.28	0.08	0.12	0.20	0.28	0.31	0.20	0.24	0.28	0.43
1130	0.20	0.43	0.12	0.04	0.28	0.12	0.16	0.55	0.12	0.16	0.16	0.31
1100	0.00	0.00	0.51	0.20	0.28	0.83	0.43	0.08	1.02	0.51	0.35	0.12
1030	0.67	0.67	0.31	0.55	0.31	0.31	0.63	0.00	0.00	0.12	0.00	0.08
1000	0.04	0.43	0.20	0.47	0.04	0.16	0.04	0.04	0.16	0.39	0.79	0.83
0930	0.43	0.55	0.08	0.24	0.55	0.04	0.12	0.43	0.00	0.04	0.35	0.47
0900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
0830	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTALS:</b>	<b>2.01</b>	<b>3.15</b>	<b>1.85</b>	<b>1.89</b>	<b>1.89</b>	<b>2.09</b>	<b>2.13</b>	<b>1.93</b>	<b>2.09</b>	<b>1.81</b>	<b>2.32</b>	<b>2.56</b>

- 4099 Las Vegas Wash at Rainbow Garden Weir
- 4544 Las Vegas Wash at Pabco Road
- 4619 Lower Duck Creek Detention Basin
- 4644 NWS Offices
- 4704 Sloan at I-15
- 4714 Pittman-Pecos Channel
- 4719 Pittman East Detention Basin
- 4724 Anthem Detention Basin
- 4734 Pittman Wash at Wigwam Ave.
- 4759 Pittman Park Detention Basin
- 4769 Pioneer Detention Basin
- 4774 TIMET

**Table 4. Peak Rainfall Intensities (all units are inches)  
August 21-22, 2012  
Southern Las Vegas Valley**

<b><u>Stn ID</u></b>	<b><u>5 min</u></b>	<b><u>10 min</u></b>	<b><u>15 min</u></b>	<b><u>30 min</u></b>	<b><u>1 hr.</u></b>	<b><u>2 hrs.</u></b>	<b><u>3 hrs.</u></b>	<b><u>TOTAL</u></b>
<b>4099</b>	0.28	0.43	0.43	0.51	1.06	1.14	1.65	<b>2.01</b>
<b>4544</b>	0.39	0.67	0.91	1.02	1.61	2.09	2.80	<b>3.15</b>
<b>4619</b>	0.12	0.24	0.31	0.63	0.83	1.26	1.54	<b>1.85</b>
<b>4644</b>	0.16	0.31	0.43	0.51	1.02	1.42	1.54	<b>2.01</b>
<b>4704</b>	0.20	0.31	0.43	0.55	0.59	1.18	1.57	<b>1.89</b>
<b>4714</b>	0.28	0.51	0.67	0.94	1.02	1.42	1.73	<b>2.36</b>
<b>4719</b>	0.16	0.31	0.47	0.83	1.06	1.42	1.69	<b>2.17</b>
<b>4724</b>	0.20	0.35	0.39	0.63	0.87	1.10	1.38	<b>1.93</b>
<b>4734</b>	0.28	0.47	0.63	1.02	1.14	1.57	1.69	<b>2.28</b>
<b>4759</b>	0.28	0.43	0.47	0.59	0.79	1.30	1.54	<b>1.81</b>
<b>4769</b>	0.35	0.59	0.71	0.71	1.10	1.46	1.89	<b>2.32</b>
<b>4774</b>	0.47	0.71	0.83	0.83	1.34	1.65	2.20	<b>2.56</b>

4099 Las Vegas Wash at Rainbow Garden Weir  
4544 Las Vegas Wash at Pabco Road  
4619 Lower Duck Creek Detention Basin  
4644 NWS Offices  
4704 Sloan at I-15  
4714 Pittman-Pecos Channel  
4719 Pittman East Detention Basin  
4724 Anthem Detention Basin  
4734 Pittman Wash at Wigwam Ave.  
4759 Pittman Park Detention Basin  
4769 Pioneer Detention Basin  
4774 TIMET



**Table 5. Maximum Depth and associated Storage Volumes**

<b><u>Facility Name</u></b>	<b><u>Max Depth</u></b>	<b><u>Volume</u></b>
Lower Duck Creek	8 feet	260 acre feet
Duck Creek Railroad	5.3 feet	150 acre feet
Upper Flamingo	5.7 feet	130 acre feet
Tropicana	24 feet	110 acre feet
Pittman East	13 feet	90 acre feet
Pioneer	18 feet	90 acre feet
McCullough Hills	5.7 feet	21 acre feet

**Table 6. Maximum Depth and associated Peak Discharge**

<b><u>Location</u></b>	<b><u>Max Depth</u></b>	<b><u>Discharge (est)</u></b>
Pittman Wash at Stephanie	5.3 feet	5,500 cfs
Duck Creek near Broadbent	5 feet	10,300 cfs
Flamingo Wash at Nellis	3.3 feet	3,420 cfs
Las Vegas Wash at Sahara	5.3 feet	3,600 cfs
at Vegas Valley Drive	2.7 feet	4,670 cfs
at Rainbow Garden Weir	5 feet	7,870 cfs

The discharge estimates presented are *estimates* and subject to change.

# NE Clark County Rainfall (inches)

Rainfall totals for 1 day  
Aug 22 2012 9:00

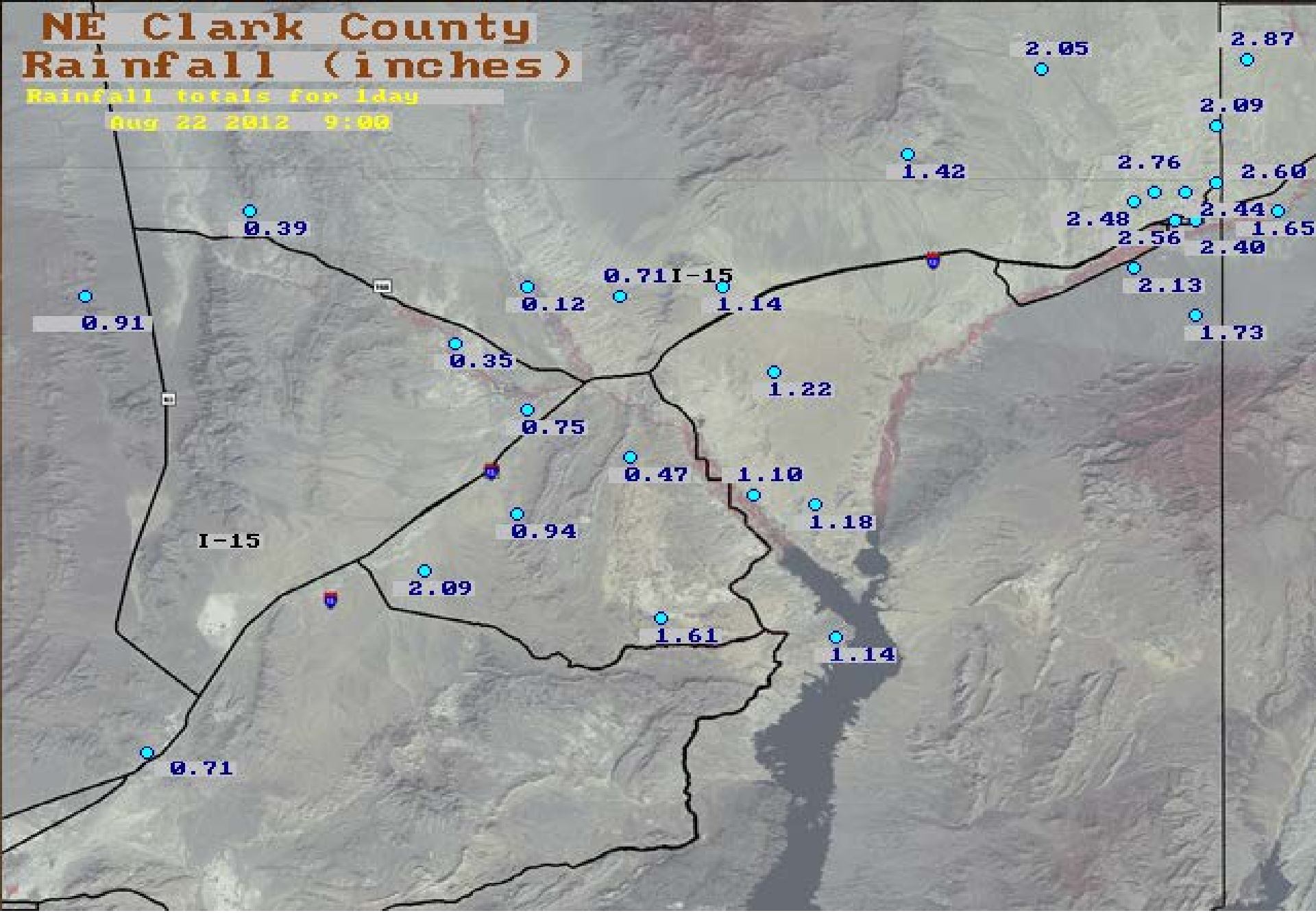


Figure 1. Northeast Clark County rainfall totals for the 24-hour period ending at 9PM August 22, 2012. (CCRFCD FTRS)



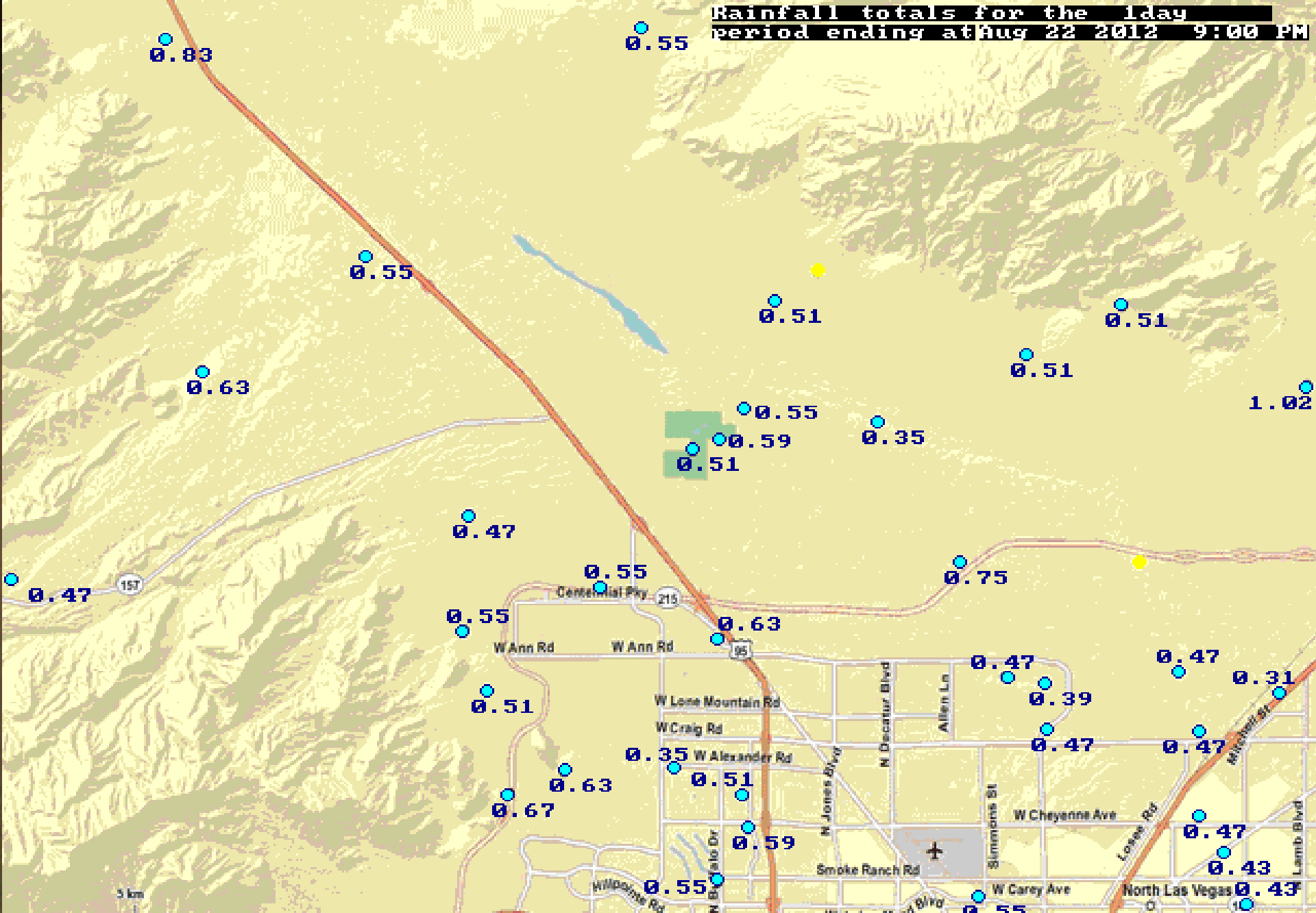


Figure 3. Northwest Las Vegas Valley rainfall totals for the 24-hour period ending at 9PM August 22, 2012. (CCRFCFDTFRS)

**Rainfall totals for the 1 day**  
**period ending at Aug 22 2012 9:00 PM**

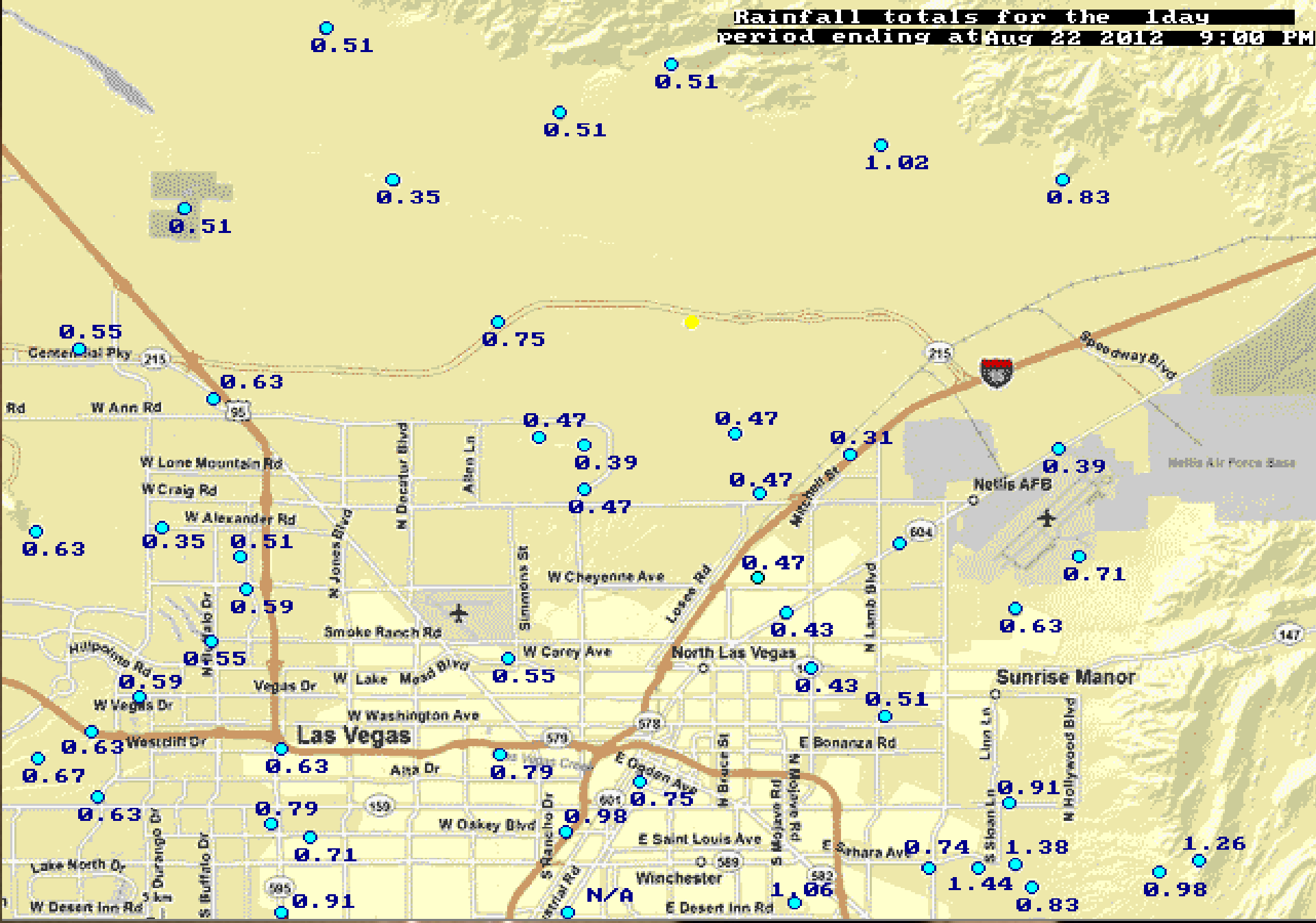


Figure 4. Northeast Las Vegas Valley rainfall totals for the 24-hour period ending at 9PM August 22, 2012. (CCRFCDFTRS)

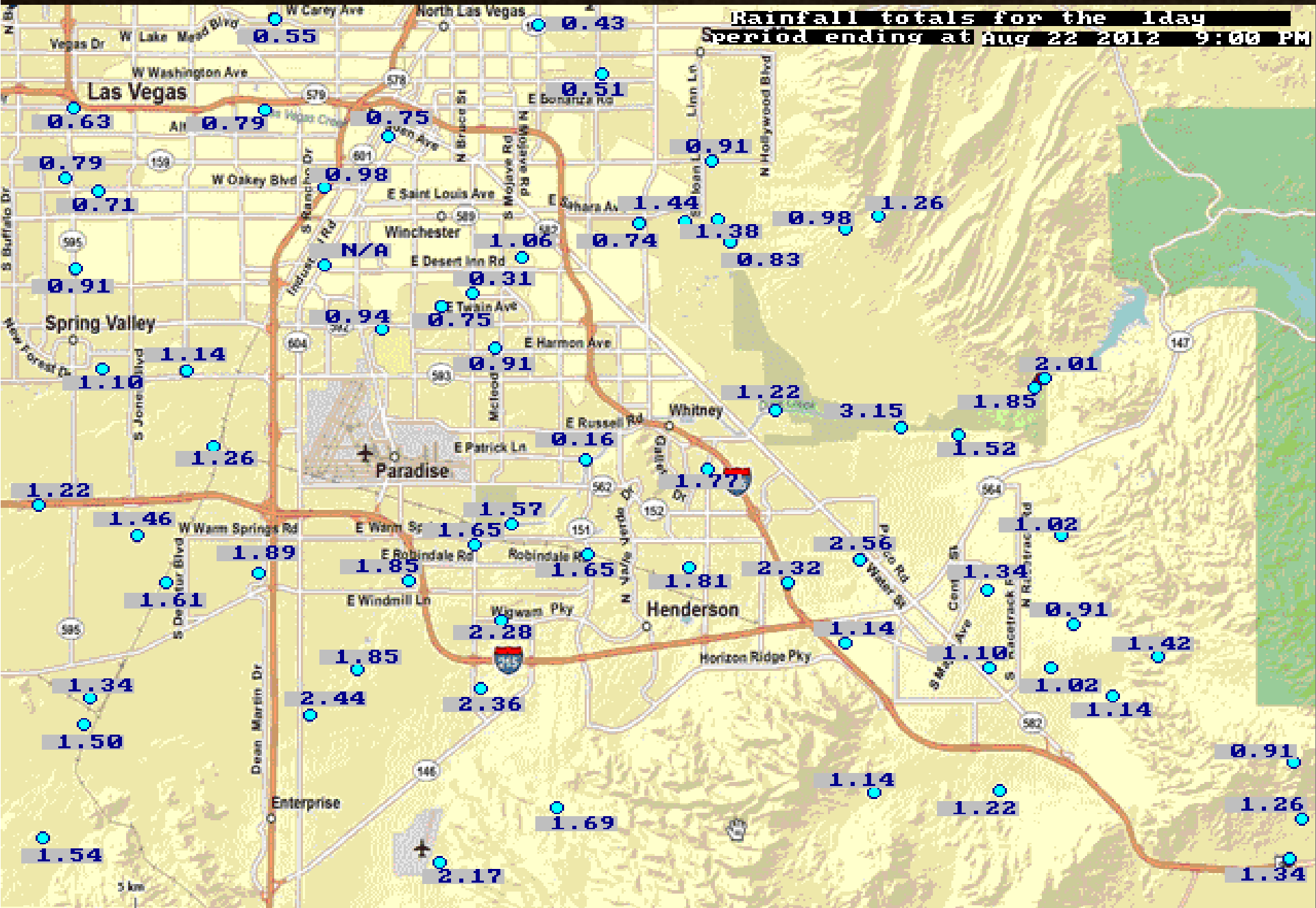


Figure 5. Southeast Las Vegas Valley rainfall totals for the 24-hour period ending at 9PM August 22, 2012. (CCRFCD FTRS)



# NW Clark County Rainfall (inches)

Rainfall totals for 1day  
period ending at Aug 22 2012 9:00

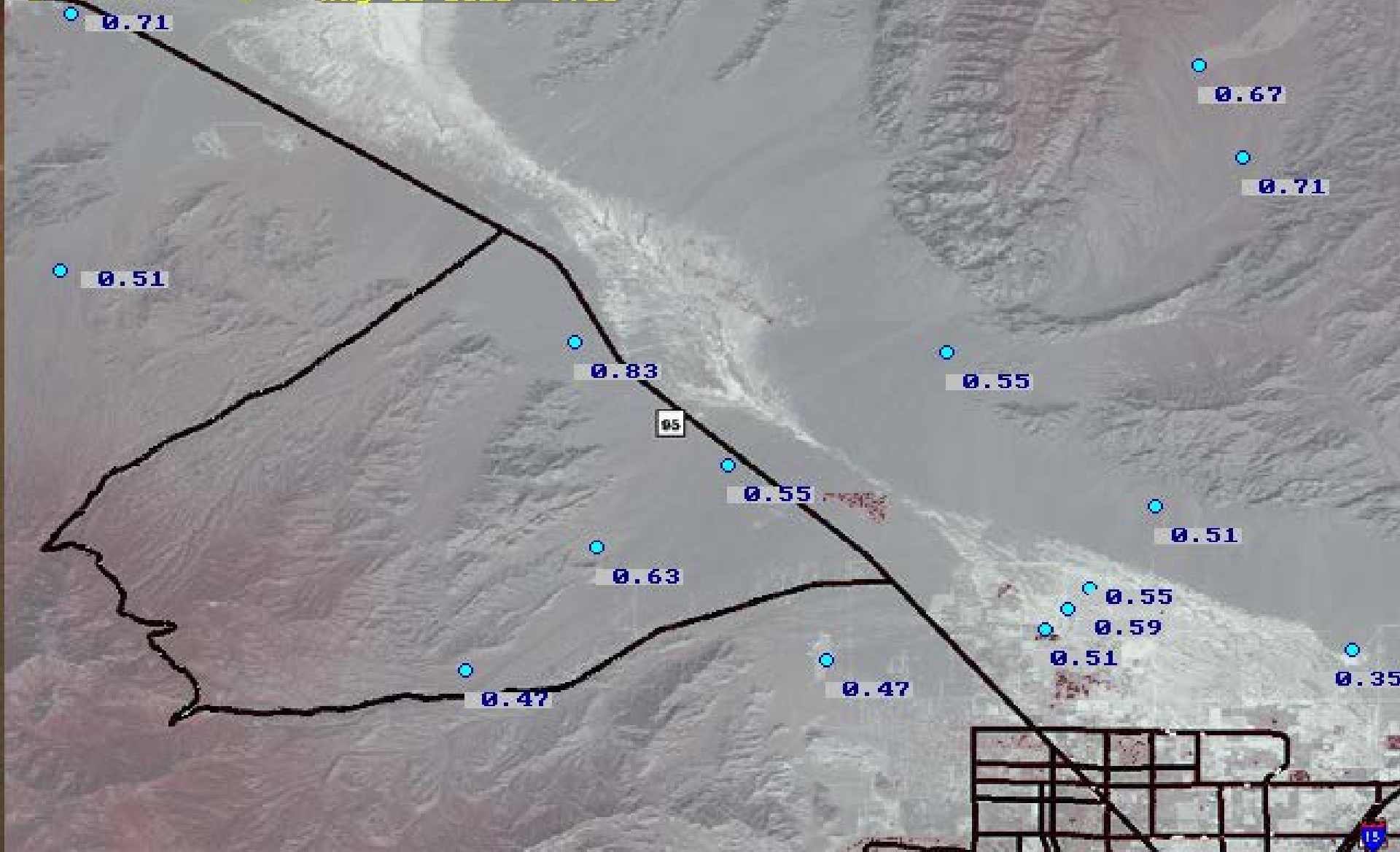


Figure 7. Northwest Clark County rainfall totals for the 24-hour period ending at 9PM August 22, 2012. (CCRFCF FTRS)



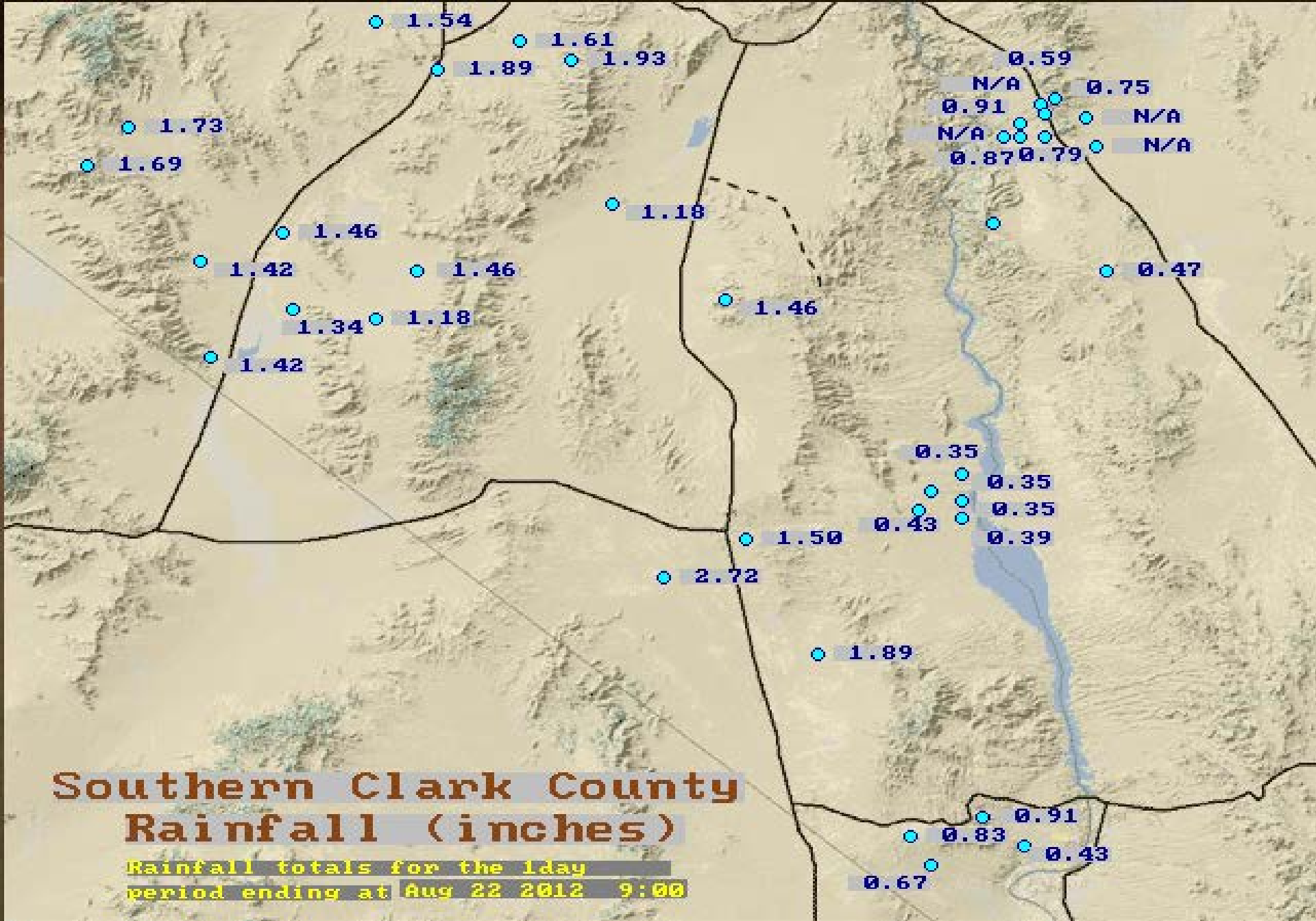


Figure 8. Southern Clark County rainfall totals for the 24-hour period ending at 9PM August 22, 2012. (CCRFCF FTRS)

Duck Creek east of Mountain Vista  
Gabion Damage



**Duck Creek west of Stephanie  
Gabion Damage**



**Duck Creek east of Nellis  
Slope Erosion**



# **A Preliminary Summary Of The August 22, 2012 Las Vegas Valley Heavy Rain And Flash Flood Event**

Chris Stachelski

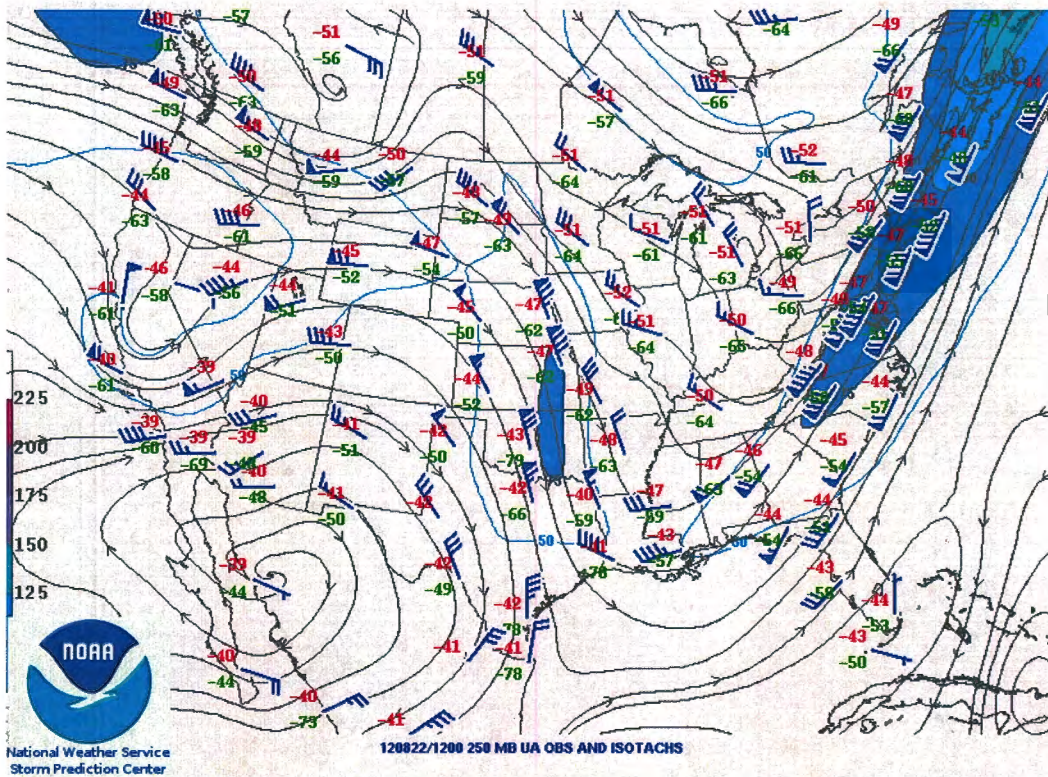
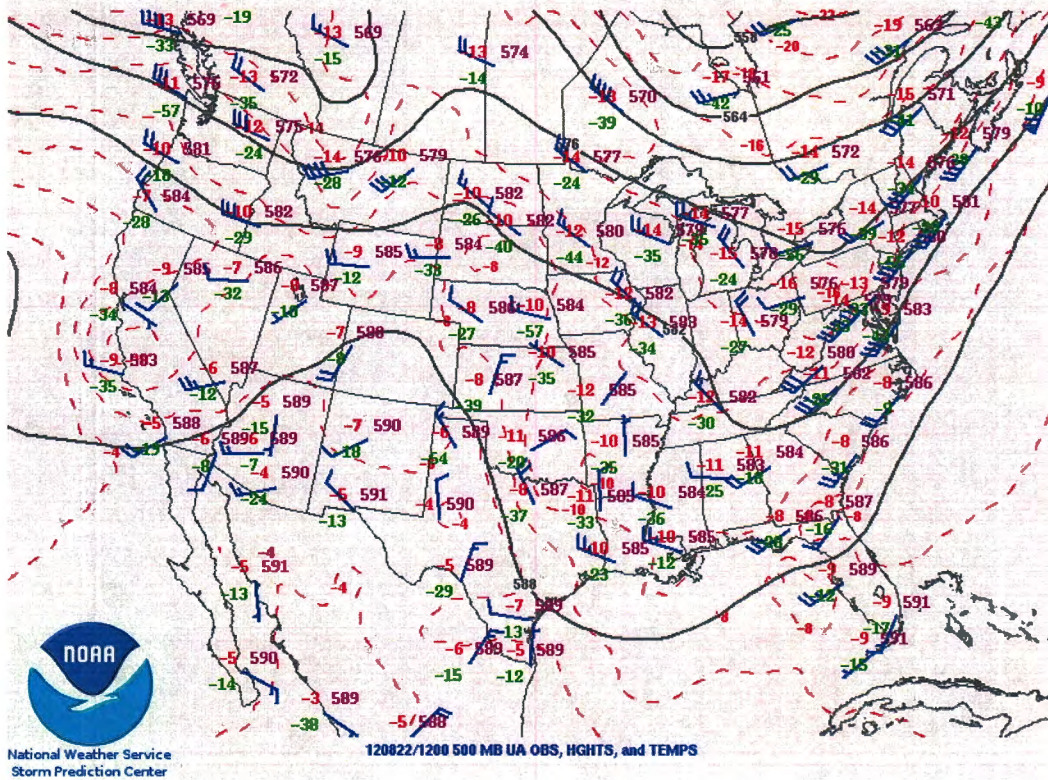
During the late morning hours of August 22, 2012 exceptionally heavy rain fell from thunderstorms over the southern half of the Las Vegas Valley, especially from McCarran International Airport south and east. Widespread rainfall totals of 1 to 2 inches with isolated higher amounts were observed in the southern half of the Las Vegas Valley, with most of this falling in about a 3 hour period. This is roughly 40 percent of the normal annual precipitation for these areas. Significant flash flooding took place as a result in the southern half of the Las Vegas Valley, particularly in Henderson.

## **The Set-Up**

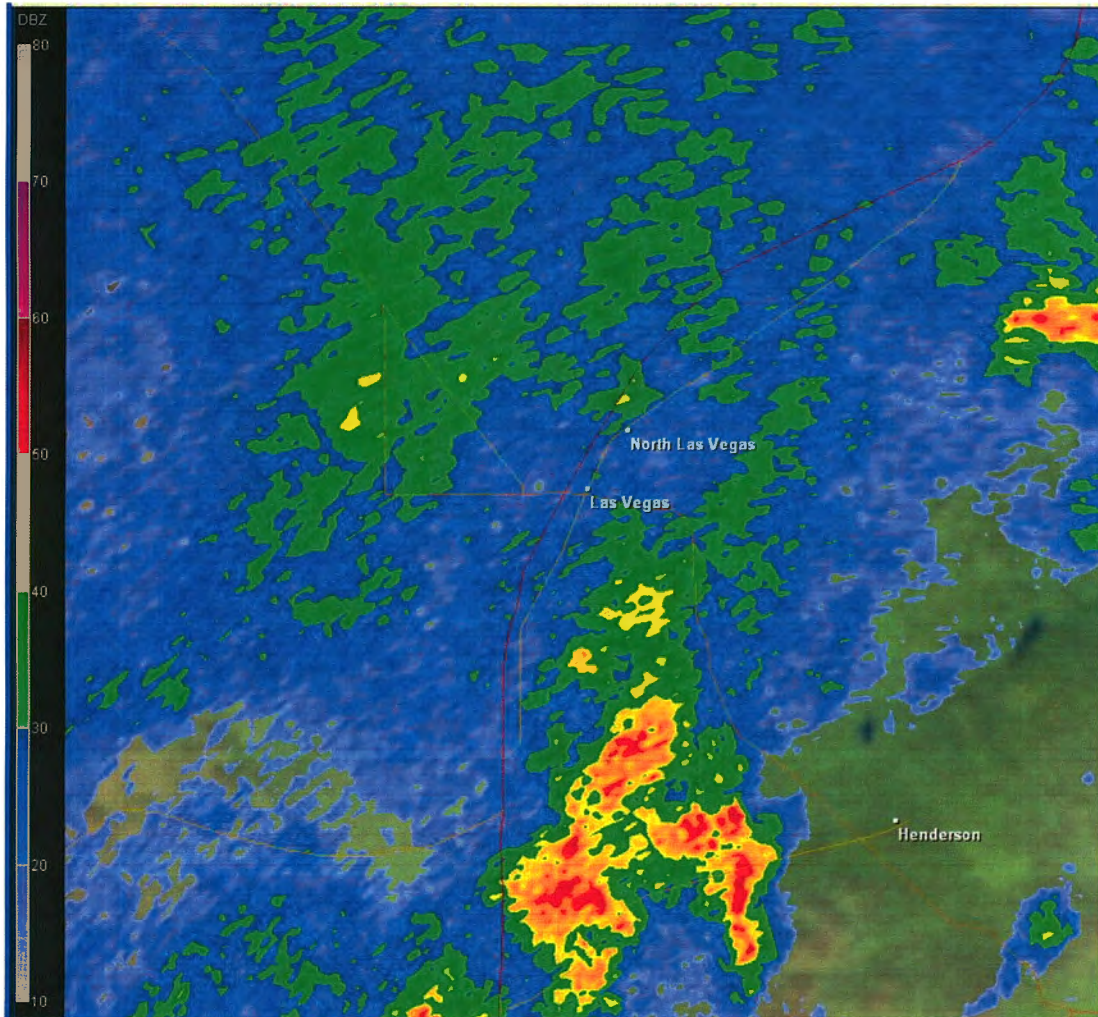
Upper air analysis from the morning of August 22, 2012 (12Z) showed an area of low pressure across central California in the atmosphere from 850 mb through 250 mb that was moving east. Exceptionally high moisture was in place across southern Nevada with the observed 850 mb dewpoint temperature on the 12Z radiosonde launched from the Las Vegas National Weather Service office at 15 degrees Celsius. Typically as a rule of thumb, any values above 8 degrees Celsius at 850 mb are considered impressive during the monsoon season and a good indicator of thunderstorms having heavy rain potential. In addition, good diffluence aloft can be noted in the mid and upper levels of the atmosphere across southern Nevada along with a 55 knot jet streak at 250 mb, both which helped to support enhanced lifting of air parcels in the atmosphere. The combination of this enhanced lift and an extremely moist atmosphere produced a set-up favorable for thunderstorms producing heavy rain.

## **What Happened**

Showers and thunderstorms began to move into the Las Vegas Valley around 8 AM PDT on August 22nd and became more numerous around 9 AM PDT. The heaviest activity developed shortly after 10 AM PDT and moved across the southeast portion of the Las Vegas Valley as noted by radar returns and observations from the automated weather stations at McCarran International Airport and the Henderson Executive Airport. The heaviest rain generally ended around 12 PM PDT with only light rain falling in most areas after that through around 5 PM PDT.



Upper air charts showing the observed values at 500 mb and 250 mb at 12Z on August 22, 2012. Blue wind barbs can be noted on both maps while solid black lines indicate height lines. Maps courtesy Storm Prediction Center.



KESX 0.5 degree radar reflectivity at 1740Z on August 22<sup>nd</sup>. Note the brighter colors over the southeast part of the Las Vegas Valley where heavier rain was falling.

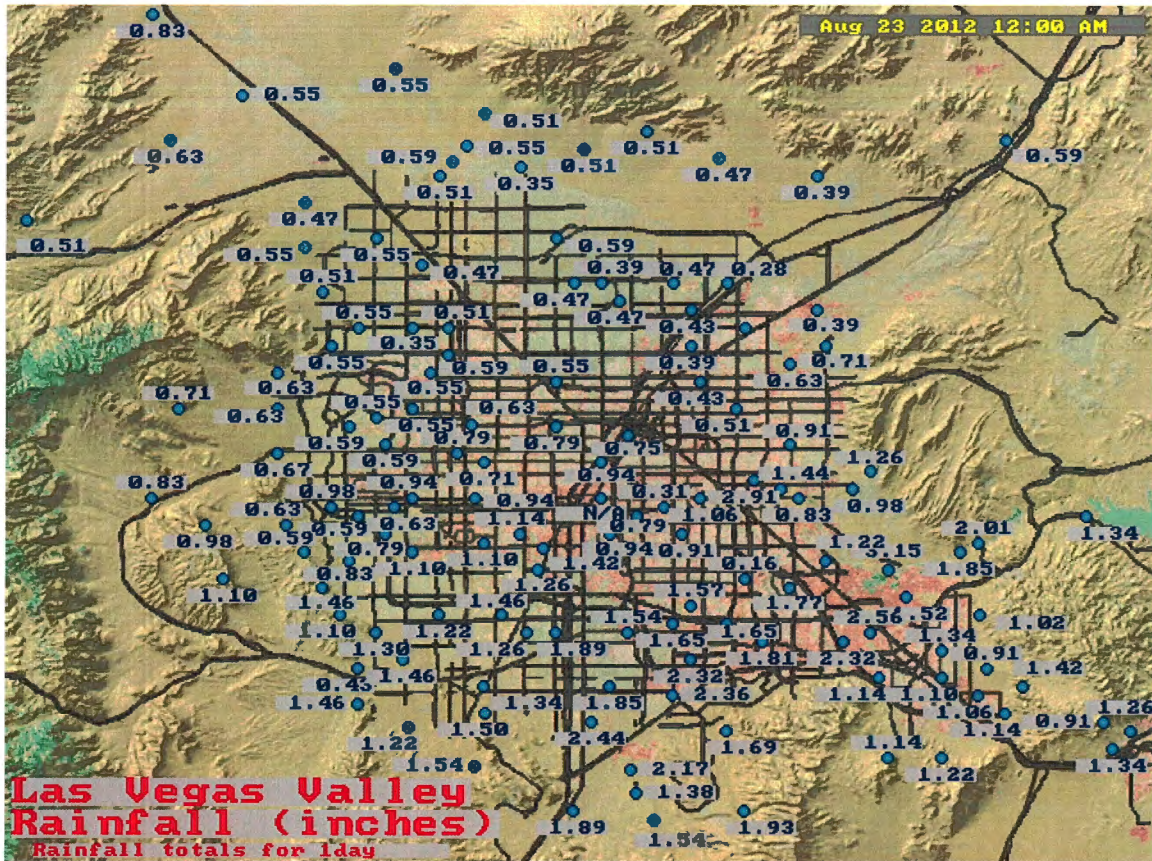
## Impacts

Numerous roads throughout the southern half of the Las Vegas Valley were flooded, many with several feet of water along with vast quantities of mud and large rocks. The first report of flash flooding in the Las Vegas Valley was at 1045 AM PDT in the Spring Valley neighborhood. More significant flooding took place in Henderson just after 1100 AM PDT, with a number of roads being closed. Even portions of Las Vegas Boulevard were flooded including on The Strip. Many vehicles became immersed in floodwaters, including a number that were parked in low lying areas. At least 21 swiftwater rescues were conducted in the Las Vegas Valley by first responders. A church suffered over \$500,000 in damages after 3 feet of floodwaters entered it. Washes swelled with rapidly flowing water. A 17 year old boy was found dead after he fell into a wash near Stephanie and Sunset in Henderson and was swept miles downstream toward the Las Vegas Wetlands Park on the east side of the Las Vegas Valley.

## Rainfall Totals

The official long term climate station for Las Vegas is located at McCarran International Airport on the southwest side of the airport complex. The total rainfall here was 1.65 inches, most of which fell in a 3 hour period between 9 AM and 12 PM PDT. This was the second highest calendar day total ever measured at the official Las Vegas climate station since records started in 1937. The all-time record remains 2.58 inches set on August 21, 1957. Since records have started, only 25 days in Las Vegas have ever recorded an inch or more of rain.

Automated weather stations operated by the Clark County Regional Flood Control District as well as Mesonet weather stations, cooperative observers and spotter reports showed the heaviest rain of 1 to 2 inches fell generally along and south of Tropicana Avenue with the heaviest totals in the southeast portion of the Las Vegas Valley where some locations did exceed 2 inches. The highest verifiable storm total was 3.15 inches at the Clark County Regional Flood Control District's weather station at the Las Vegas Wash at the Pabco Road grade control structure. Rainfall amounts decreased significantly further north in the Las Vegas Valley with a general one third to two-thirds of an inch measured north of Highway 95.



Las Vegas Valley rainfall totals from August 22, 2012 from automated weather stations operated by the Clark County Regional Flood Control District.



## **How Does Often Rain This Heavy Occur Historically?**

Although a storm total of 1.65 inches of rain fell at McCarran International Airport during this event, the heaviest rain generally fell in a 3 hour period. The highest 3 hour total measured was 1.46 inches. Using point precipitation estimates calculated specifically for McCarran International Airport and the 3 hour precipitation total, this was roughly a 30 year rainfall event for the McCarran Airport weather station.

## **How Does This Flood Compare To The July 8, 1999 Flash Flood?**

The flash flood of July 8, 1999 remains the most significant flash flood event in modern Las Vegas history. Total damages in 1999 dollars were \$25 million. Although McCarran Airport did see more rain with this event than on July 8, 1999 (a storm total of 1.29 inches fell then), the rainfall with this event was not nearly as intense in as short of a period. During the July 8, 1999 flash flood a total of 1.05 inches fell in one hour at McCarran International Airport, while the highest one hour total in this event was 0.83 inch. This likely did help to mitigate some of the flooding.

Another factor that likely helped mitigate flooding in this event was that rainfall totals over the west-central and central portions of the Las Vegas Valley were significantly lower. During the July 8, 1999 event 1 to 3 inches of rain fell in these areas while in this event totals were between a half an inch and an inch in areas such as Summerlin. This resulted in much less water running into the headwaters of washes that run across the Las Vegas Valley such as the Flamingo. During the July 8, 1999 flash flood, the heavy rain across the west side of the valley resulted in significant runoff that traveled down across the valley and was compounded by the heavy rain that also fell over areas such as The Strip. This resulted in devastating results by the time the floodwaters reached the east side of the valley near washes.

Lastly, a major reason for less flooding with this event is the overall flood control structure in the Las Vegas Valley has improved greatly since 1999 thanks to the work of the Clark County Regional Flood Control District.

## **Just How Humid Was It?**

One of the most interesting things observed during this event was the duration in which the relative humidity at McCarran International Airport reached 100 percent. It is exceedingly rare to observe 100 percent humidity in Las Vegas, especially for the duration this event did and during the warm season in general. Observations at McCarran showed the relative humidity at 100 percent continuously from 1031 AM until 1111 AM PDT. At the Henderson Executive Airport, 100 percent humidity was reported on all observations from 1020 AM through 110 PM PDT.



Flash flooding in the south portion of the Las Vegas Valley on August 22, 2012 showing vehicles stuck in floodwaters. Photos courtesy: J. Porter.



Aftermath of the flood. Photo courtesy: J. Porter.



Flooding at a bus stop on the south end of Las Vegas Boulevard. Photo Courtesy: R. Peiper.