

Rainfall & Flood Event Report

September 11, 2012

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

On September 11, 2012, for the second time in three weeks, severe weather with wide-spread heavy rain moved through the Las Vegas Valley and other parts of Clark County causing deadly flooding. Rainfall rates near or exceeding one inch in 30 minutes were recorded in several locations with the most severe rain occurring in the Lone Mountain, downtown Las Vegas, and UNLV areas. The National Weather Service (NWS) officially recorded 1.18 inches of rain, the most rainfall ever recorded for any September day since records began to be kept in 1937. The heavy rainfall resulted in major flow in the areas' washes, numerous instances of street flooding, and scores of flooded residences and businesses. Flood flows in the Las Vegas Wash and Flamingo Wash converged at the Desert Rose Golf Course where a landscaper was presumed to have been swept downstream to his death. (At the time this report was written, the Clark County Coroner's Office had not officially established a cause of death.)

After a brief drying period at the end of August, very moist air again moved into the southern Nevada region in early September. Moist atmospheric conditions and the potential for flash flooding caused the NWS to host several informational briefings for local emergency responders beginning on September 7. The NWS issued a Flash Flood Watch on Monday September 10 that extended into the early hours of September 11; the Flash Flood Watch was extended as conditions favorable for intense rainfall in the area continued to develop. The Watch was upgraded to a Flash Flood Warning for extreme eastern Clark County in the early morning hours of September 11, and for the Las Vegas Valley by mid-day. (Attachment A, the NWS's *Preliminary Summary of the September 11, 2012 Las Vegas Valley Heavy Rain and Flash Flood Event* includes a discussion of the atmospheric conditions.)

Persistent moderate rainfall over the California Wash drainage area throughout the morning generated concern and RFCD staff advised Clark County Public Works (CCPW) and emergency responders of the potential for significant flow across Hidden Valley Road (Moapa) and ultimately in the Muddy River through Moapa Valley. Several roadways in this area were closed by CCPW, including Cooper Avenue and Lewis Avenue in Overton. NDOT closed SR168 at the south end of Overton due to flow from Overton Wash across the roadway, as well as Valley of Fire Highway, the western entrance to Valley of Fire State Park.

Peak flow in the Muddy River at Lewis Avenue is estimated to have been 700 cfs. (Normal daily flow is less than 50 cfs.) At least one driver did attempt to cross through the flow over Hidden Valley Road; flood flows washed his vehicle off the road but the driver was safely rescued.

Showers and thunderstorms began to build in the Spring Mountains west of Las Vegas in the late morning hours of September 11 and moved into the far western edges of the Valley by mid-day. Weather radar indicates that while there were several intense rainfall cells early during this event, shortly after 1:30PM there was a single large cell that extended from the far south part of the Valley to the northern extent of the urbanized area (Figures 1-8). This large rainfall mass moved generally from west to east across the Valley, coincident with the general topography of the area which falls from west to east. The result was intense rain falling on runoff from earlier rain; this rain on runoff effect is believed to have exacerbated the flooding in the Las Vegas Wash located along the eastern part of the Las Vegas Valley. Based on the peak water levels reported by Regional Flood Control District Flood Threat Recognition System (FTRS) stations and channel geometry, estimates of the peak flow in the Las Vegas Wash range from more than 5000 cfs at Cheyenne Avenue, to 9150 cfs below Sahara Avenue, to in excess of 12,000 cfs at Lake Las Vegas. Construction activities in Las Vegas Wash between Cheyenne Avenue and Lake Mead Blvd. may have affected the water level depths reported by the FTRS stations in that reach.

During this event, seventeen FTRS rain gages in the Las Vegas Valley measured at least 1 inch of rain, most of which occurred in less than 2 hours. Tables 1 & 2 present representative data on the rainfall and rainfall intensities measured by the FTRS gages. Figures 9-17 present the 24-hour rainfall totals throughout Clark County as reported by the FTRS.

Runoff from the rainfall west of the Beltway was intercepted by the Beltway Channel and diverted either north to the Lone Mountain Detention Basin or south to the channel system that feeds into the Angel Park Detention Basin. As the storm moved quickly to the east, the completed flood control collector system collected runoff and directed it into detention basins. Table 3 presents data on the peak depth and associated volume of runoff captured by the detention basins. However, the flood control drainage system was not able to capture all of the runoff as evidenced by the depth of ponded or flowing water in many roadways. Flooded roadways include the following:

- Charleston Underpass,
- Walton Heath, Spyglass Hill and various other roadways in the sub-divisions along the Las Vegas Wash near Sahara Avenue and Sloan Lane,
- Fairfield Avenue between Eldorado Lane and Robindale Road,
- Gillespie Street between Eldorado Lane and Robindale Road,
- Rancho Destino Road between Eldorado Lane and Robindale Road,
- Stewart Street between Marion Drive and Lamb Blvd.,
- Sandhill Road at the Cedar Channel

The above list is not intended to be comprehensive.

According to the Clark County News Release dated September 26, 2012: “The Building Department has conducted more than 140 inspections at 91 homes and businesses, including apartments, for structural damage... Of those locations, 32 were determined to be in need of some degree of repair before they could be occupied.”

There was extensive flooding of roadways and residences in sub-divisions located adjacent to the Desert Rose Golf Course, through which both the Las Vegas Wash and Flamingo Wash flow. There were at least 60 instances of flood damage to property reported in this area. In addition, the media has reported that there were more than 20 incidents of stranded drivers needing assistance after their vehicles were inundated by flood flows. Buildings which experienced interior and/or structural damages in this area are identified in Figure 18.

In the area around the UNLV campus there were approximately 20 instances of flood damage to property. It is suspected that flow in the airport channel north of Tropicana Avenue exceeded the capacity of that channel and the excessive flow, combined with on-site rainfall, may have caused damage to properties near Naples Drive and Paradise Road. There were reports in the local media of vehicles parked in the Thomas & Mack parking lot and buildings on the UNLV campus being flooded. In addition, there were also several businesses along Maryland Parkway that suffered extensive flood damages. Buildings which experienced interior and/or structural damages in this area are identified in Figure 19.

After moving through the Las Vegas Valley, the severe rainfall continued tracking to the east and southeast, passing through the Nelson and Searchlight areas. CCPW has reported that while the road from Searchlight to Cottonwood Cove was not damaged, a significant amount of effort was required to clean debris from the roadway and repair the shoulder. In Nelson and Laughlin, clearing of debris and sediment from the roadways was also required.

During this event, the NWS advised local emergency responders that a dike had failed in Santa Clara, Utah and that flow as high as 10,000 cfs in the Virgin River could be expected. While this level of flow was regarded as being well below flood stage, it was clearly much higher than normal flow in the Virgin River and thus cause for concern. The peak flow in the Virgin River through Mesquite was approximately 3000 cfs and was uneventful.

There have been no reports of damages in either Mesquite or Boulder City as a result of this storm.

During this event there was one death. As reported in the media, a member of a landscape crew working at the Desert Rose Golf Course was reported missing after flows in both the Las Vegas Wash and the Flamingo Wash swept through the area. The body of this man was found several

days later and several miles downstream. At the time this report was written, the Clark County Coroner's Office had not established a cause of death.

Summary

An extremely moist air mass and a low pressure system moving in from the west combined and caused wide-spread heavy rainfall over large parts of the Las Vegas Valley. This storm moved from west to east across the Valley, coinciding with the general topography that slopes down from west to east. The National Weather Service measured 1.18 inches of rain during this event, the most rain ever recorded for one day in September since records have been kept (1937). Seventeen rain gages operated and maintained by the Clark County Regional Flood Control District in the Las Vegas Valley measured more than one inch of rain; two of those gages measured more than two inches of rain. The NWS communicated well with local governments and emergency responders before and throughout this event.

The swift moving storm caused wide-spread flooding of roadways and significant flows in some of the areas washes, most notably the Las Vegas Wash and Flamingo Wash. The most heavily impacted areas were the residential areas adjoining the Desert Rose Golf Course, downtown Las Vegas, and the UNLV campus and surrounding area. Based on the number of damage claims, this appears to be some of the worst flooding experienced in Las Vegas in at least ten years. One death has been attributed to the flooding.

Table 1. Rainfall Summary (All units are inches)
Las Vegas Valley
September 11, 2012

Stn ID	4209	4274	4289	4374	4399	4484	4574	4784
9/11/12								
1600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1545	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
1530	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1515	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24
1500	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.43
1445	0.00	0.08	0.12	0.20	0.12	0.16	0.20	0.20
1430	0.04	0.08	0.24	0.04	0.08	0.35	0.08	0.28
1415	0.00	0.35	0.20	0.16	0.31	0.16	0.12	0.00
1400	0.00	0.16	0.16	0.91	0.59	0.79	0.75	0.00
1345	0.04	0.51	0.87	0.20	0.08	0.51	0.24	0.00
1330	0.20	0.00	0.04	0.00	0.00	0.08	0.00	0.00
1315	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1245	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1230	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1215	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS:	2.05	1.18	1.61	1.54	1.18	2.09	1.38	1.14

Table 2. Peak Rainfall Intensities (all units are inches)
Las Vegas Valley
September 11, 2012

Stn ID	5 min	10 min	15 min	30 min	1 hr.	2 hrs.	TOTAL
4209	0.43	0.71	0.94	1.14	1.85	2.01	2.05
4274	0.28	0.43	0.55	0.83	1.10	1.14	1.18
4289	0.39	0.71	0.87	1.02	1.46	1.57	1.65
4374	0.35	0.67	0.91	1.18	1.38	1.50	1.54
4399	0.24	0.47	0.67	0.94	1.10	1.14	1.18
4484	0.39	0.75	0.98	1.38	1.81	2.01	2.09
4574	0.31	0.59	0.75	0.98	1.22	1.34	1.38
4784	0.20	0.39	0.55	0.67	1.06	1.06	1.14

4209 Summerlin NW; Smoke Ranch Rd alignment 3 miles W of Hualpai
4274 Downtown Las Vegas; on the rooftop of 301 E. Clark
4289 Freeway Channel at Oakey; NE Corner MLK Blvd and Oakey
4374 Flamingo Wash at Eastern Avenue
4399 Flamingo Wash near Mojave
4484 Tropicana Wash at Swenson
4574 Flamingo Wash near Spencer
4784 C-1 Channel near Warm Springs Road

Table 3. Maximum Depth and associated Storage Volumes at Detention Basins

<u>Facility Name</u>	<u>Max Depth</u>	<u>Volume</u>
Tropicana	23.5 feet	100 acre feet
Upper Flamingo	4.8 feet	85 acre feet
Pittman East	10.6 feet	70 acre feet
Pioneer	13.7 feet	55 acre feet
Vandenberg	6.7 feet	27 acre feet
Carey-Lake Mead	7.6 feet	25 acre feet
McCullough Hills	4.8 feet	15 acre feet
Tropicana North Branch	4.9 feet	10 acre feet
Lower Flamingo	5.7 feet	10 acre feet
Lone Mountain	4.8 feet	6 acre feet

Table 4. Maximum Depth and associated Peak Discharge

<u>Location</u>	<u>Max Depth</u>	<u>Discharge (est)</u>
Tropicana Wash at Swenson	4.3 feet	5215 cfs
Flamingo Wash at Nellis	4.6 feet	3230 cfs
Las Vegas Wash		
at Cheyenne	6.7 feet	5170 cfs
at Las Vegas Blvd.	4.6 feet	4730 cfs
at Lake Mead Blvd.	6.4 feet	6325 cfs
at Sahara	7.3 feet	9150 cfs
at Vegas Valley Dr.	7.5 feet	10900 cfs
at Rainbow Garden Weir	8.5 feet	12000 cfs

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

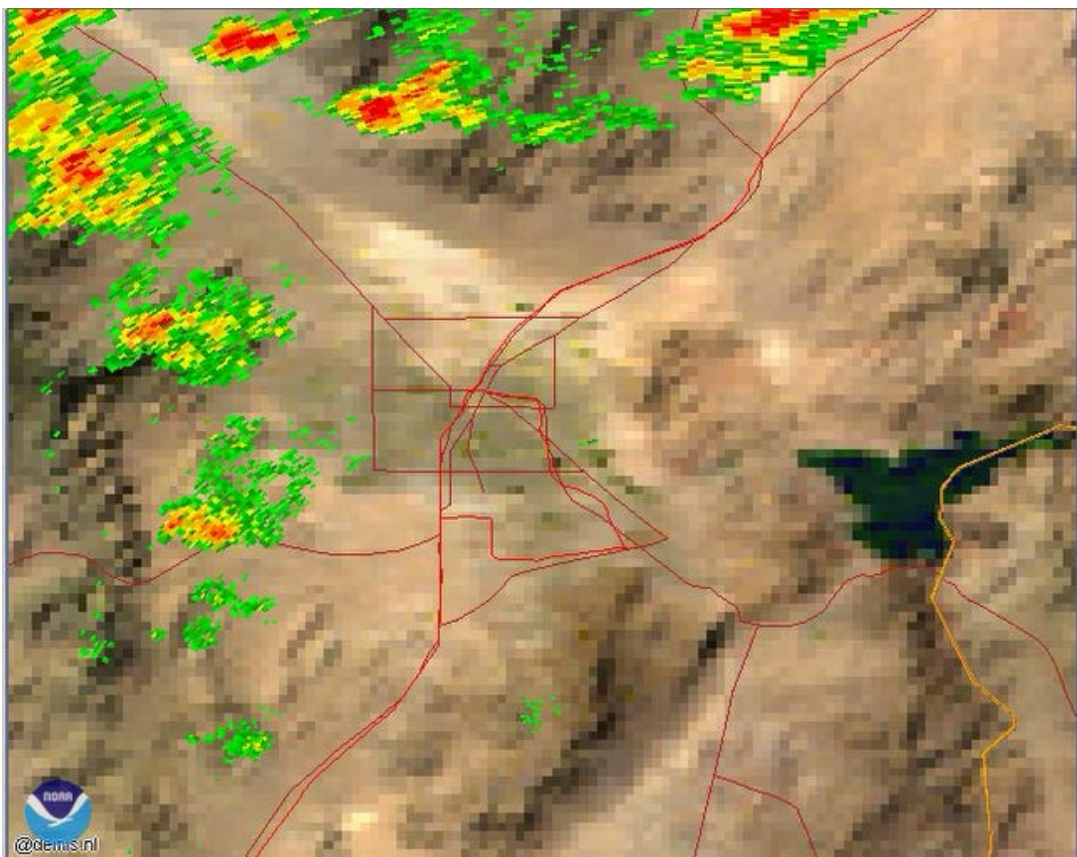


Figure 1. KESX radar reflectivity at 12:04 PM September 11, 2012

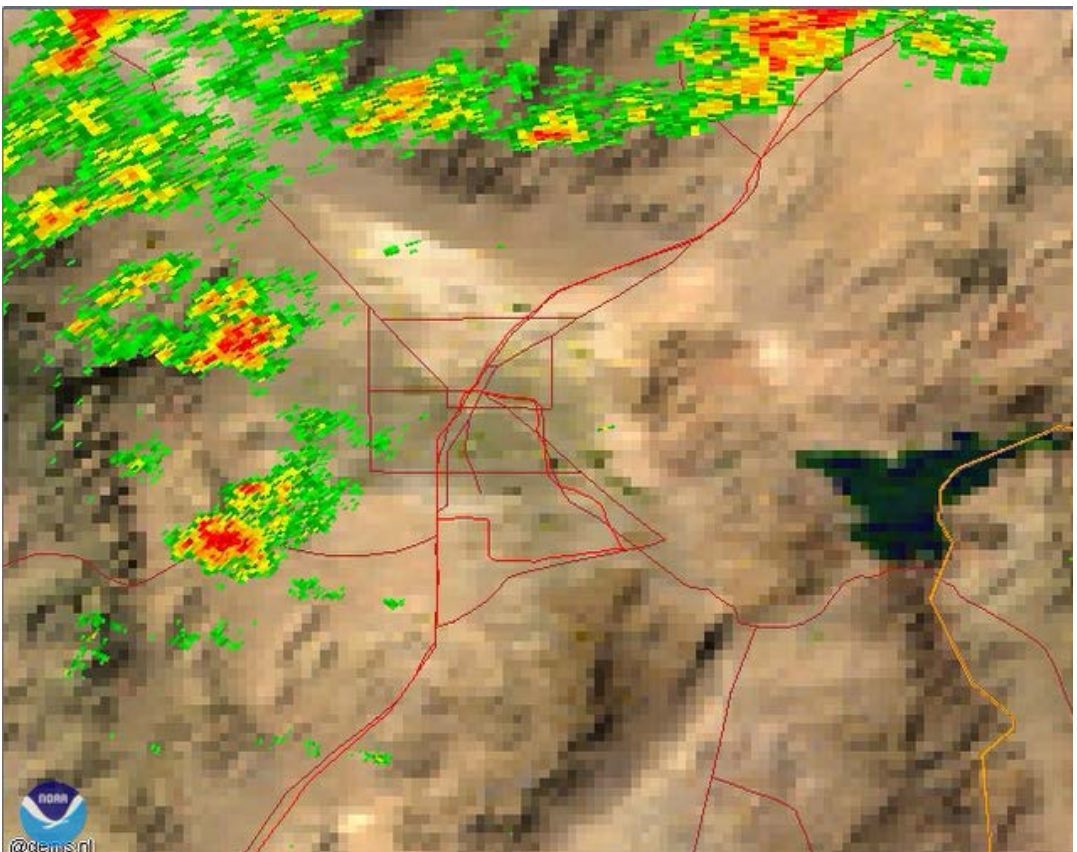


Figure 2. KESX radar reflectivity at 12:21 PM September 11, 2012

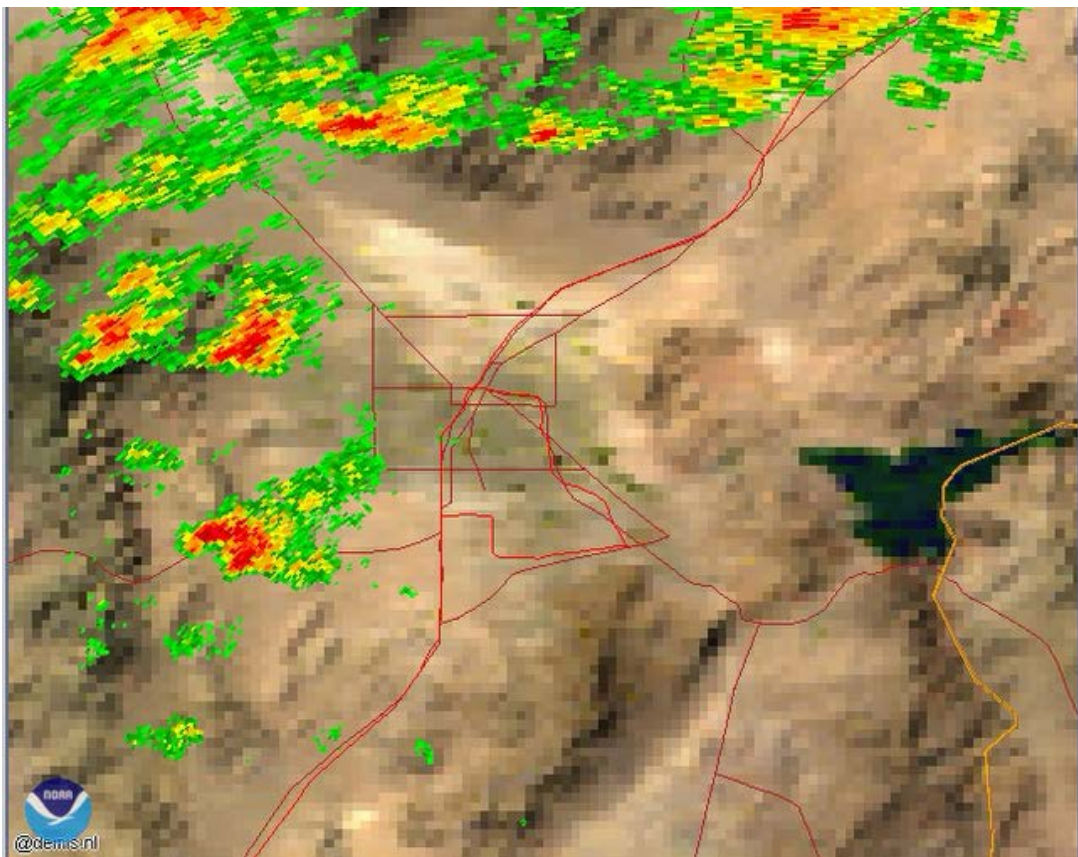


Figure 3. KESX radar reflectivity at 12:30 PM September 11, 2012

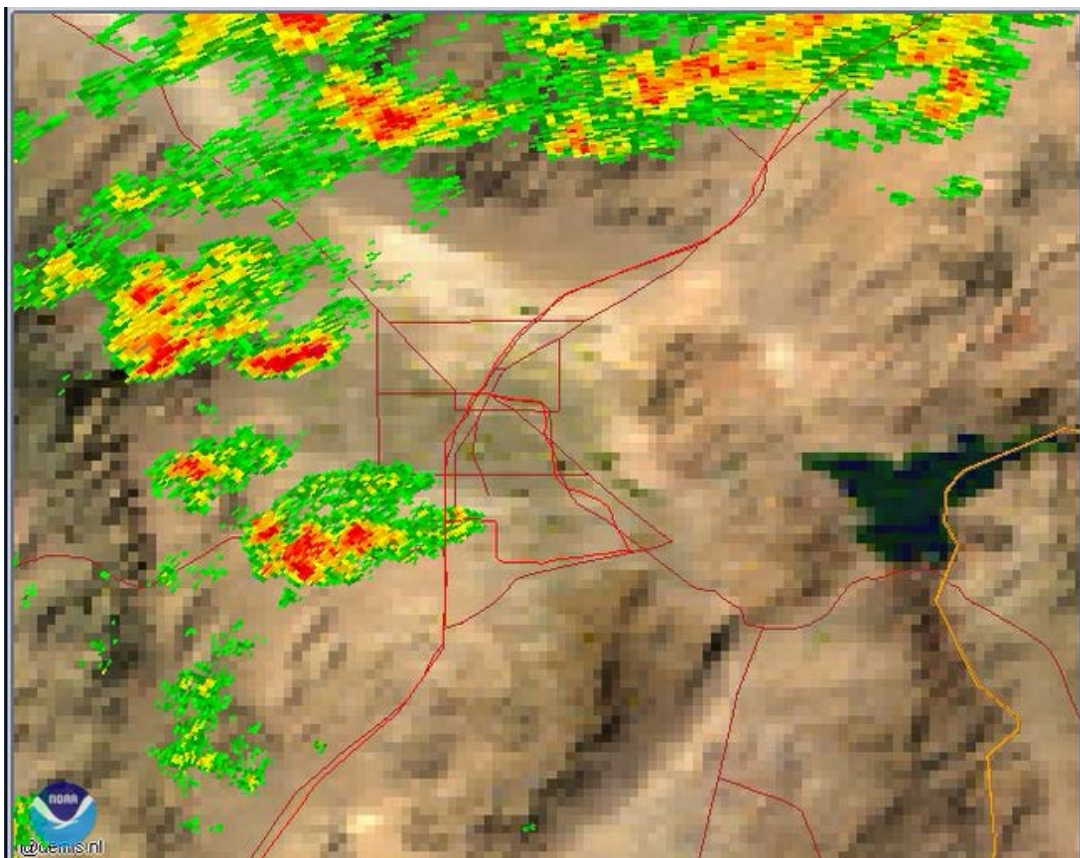


Figure 4. KESX radar reflectivity at 12:47 PM September 11, 2012

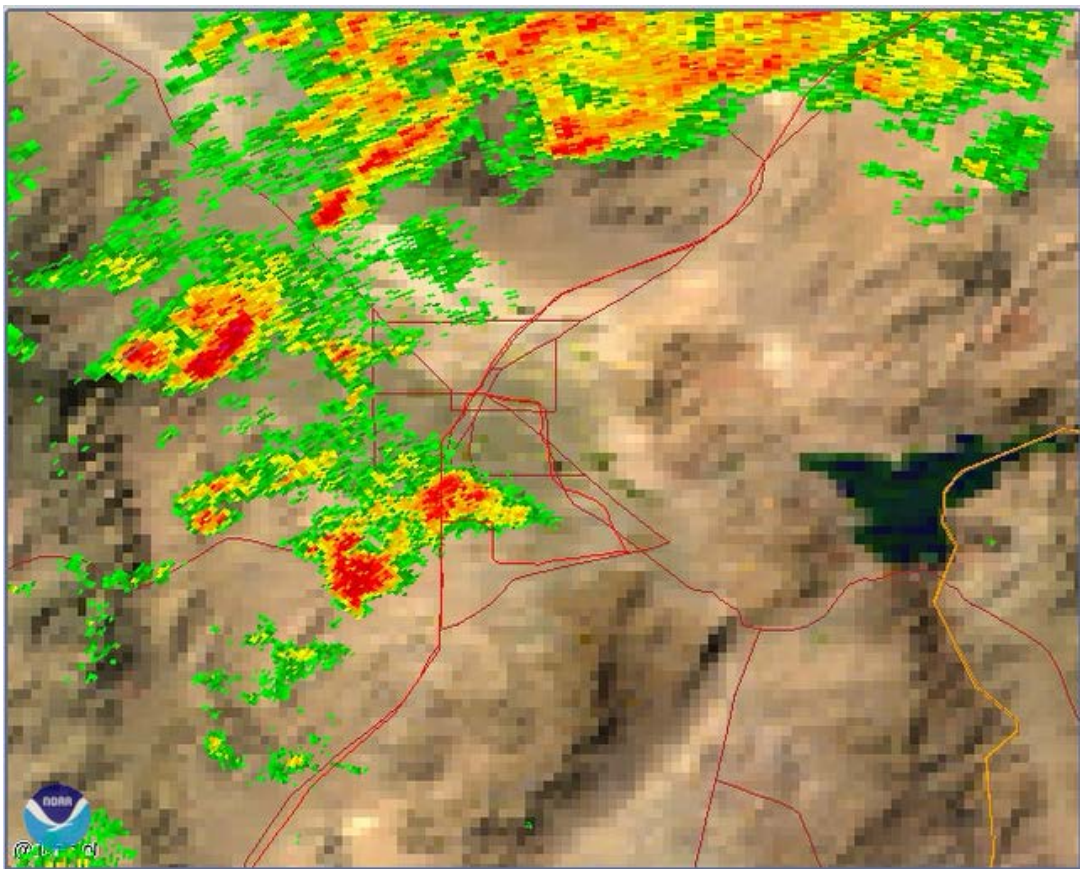


Figure 5. KESX radar reflectivity at 1:05 PM September 11, 2012

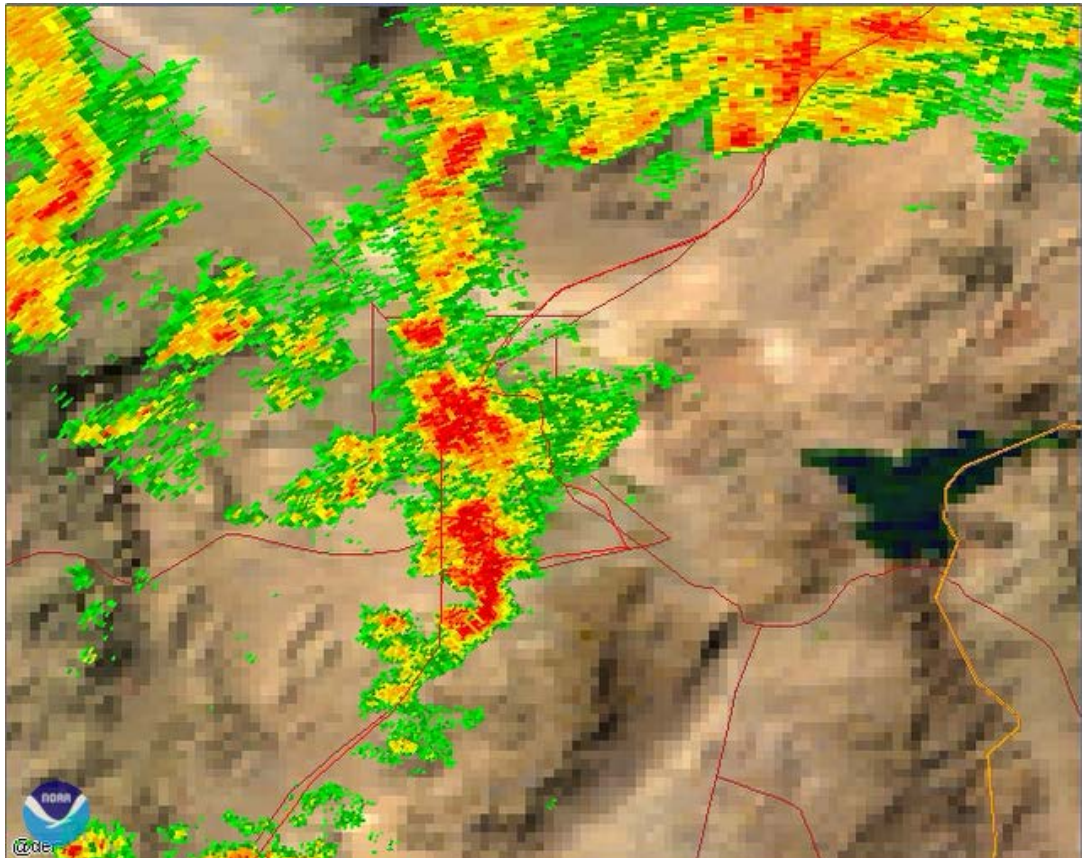


Figure 6. KESX radar reflectivity at 1:30 PM September 11, 2012

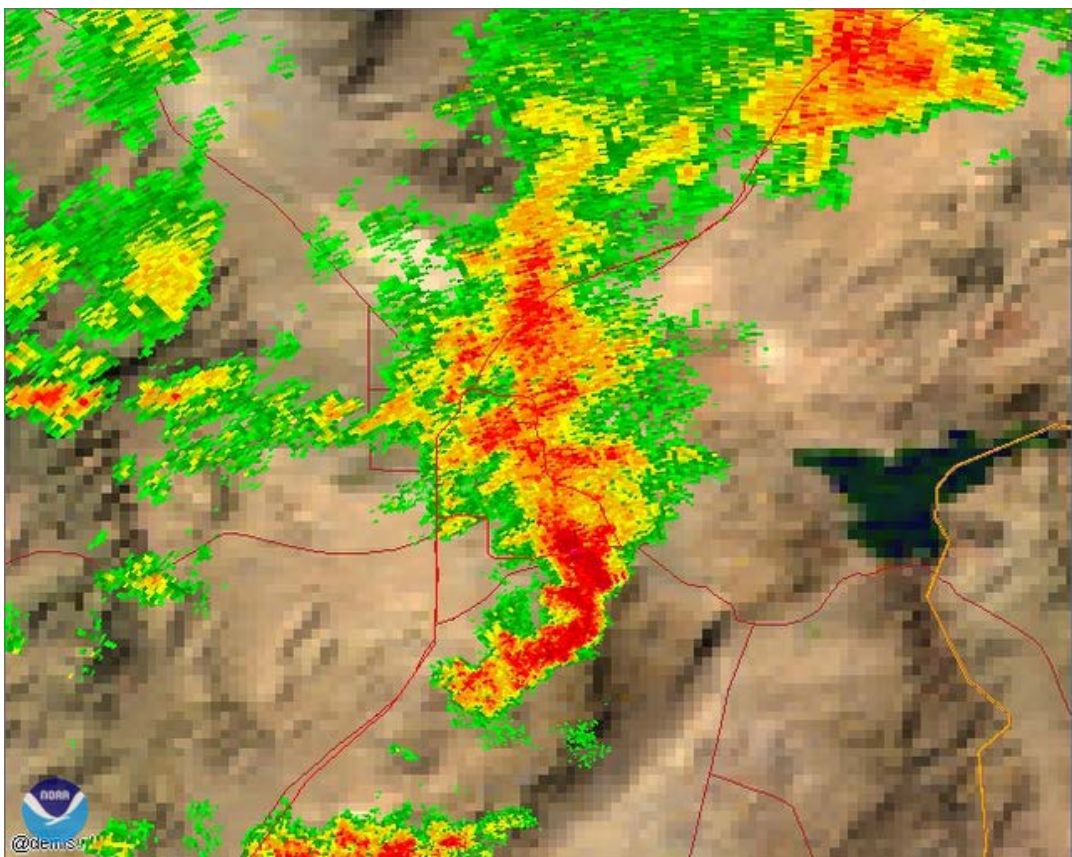


Figure 7. KESX radar reflectivity at 1:52 PM September 11, 2012

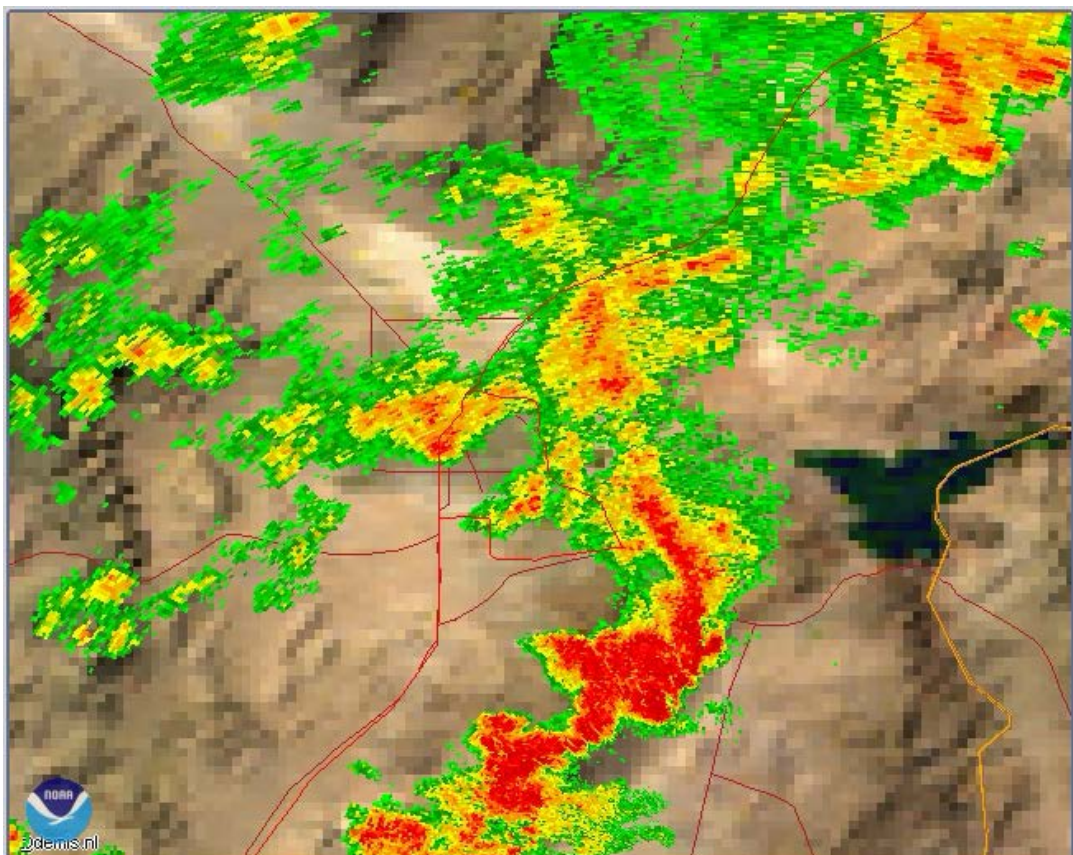


Figure 8. KESX radar reflectivity at 2:14 PM September 11, 2012

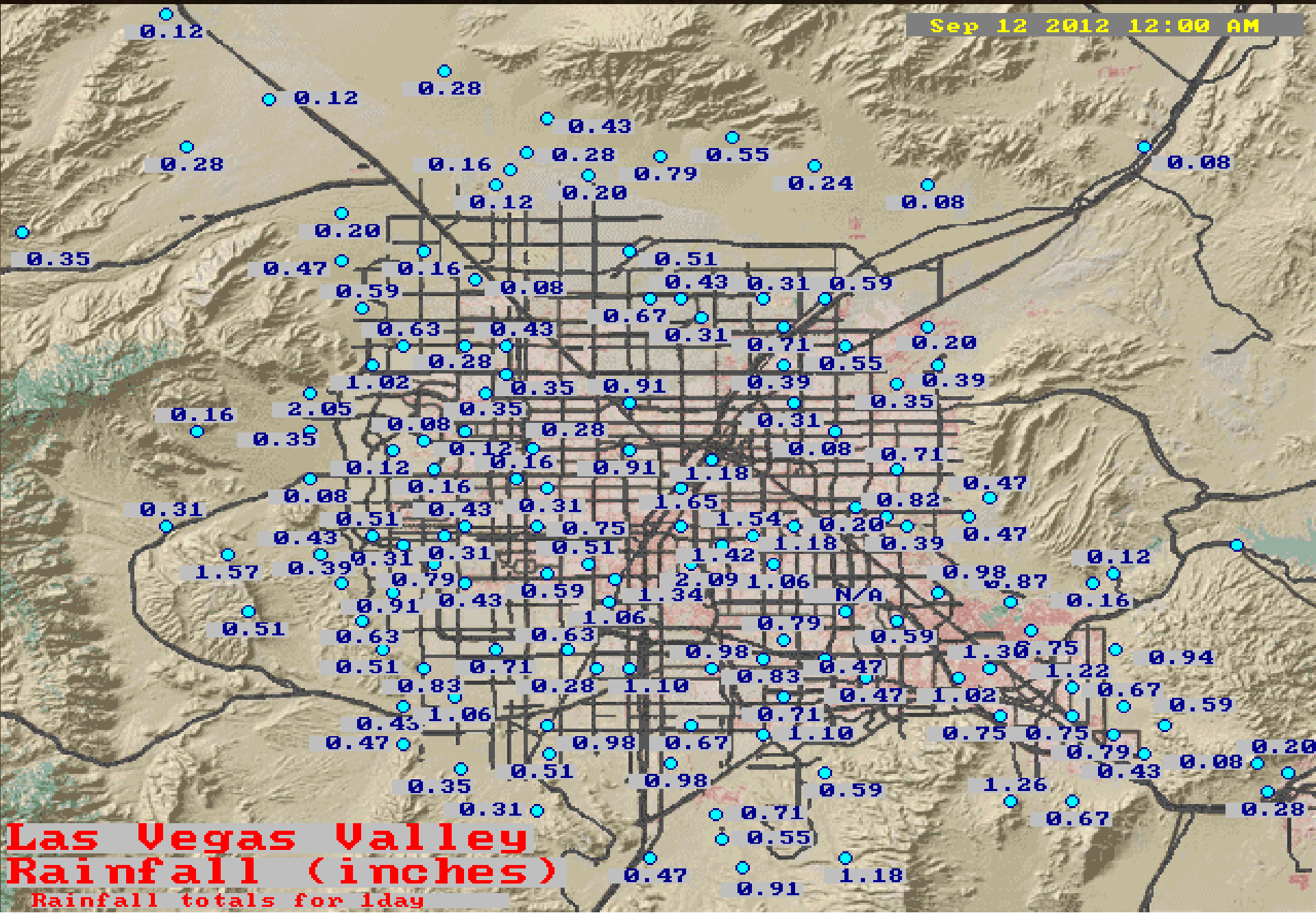


Figure 9. September 11, 2012 - 1 day rainfall totals Las Vegas Valley (RFCDFTRS)

Rainfall totals for 1 day
period ending at **Sep 12 2012 12:00 AM**

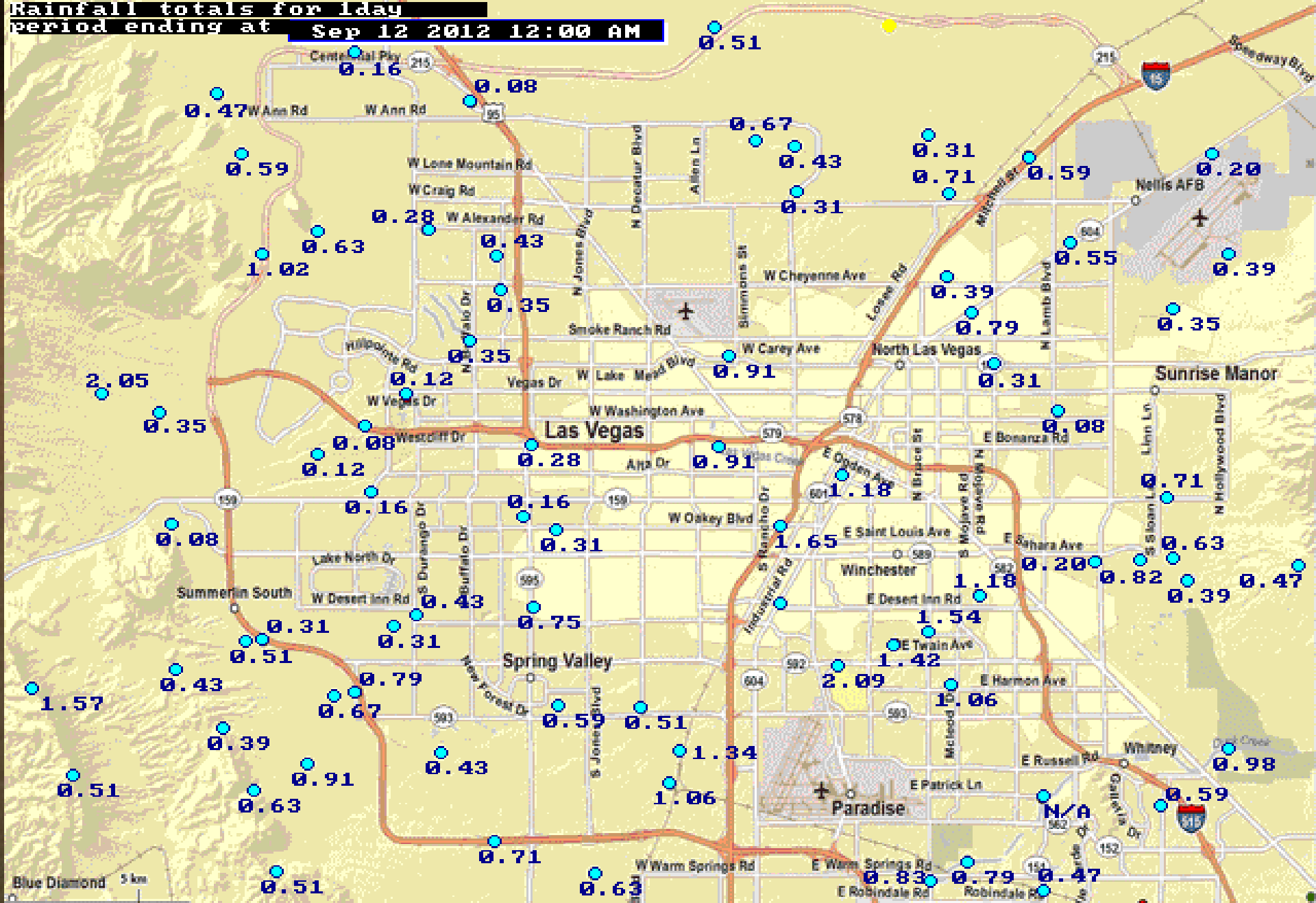
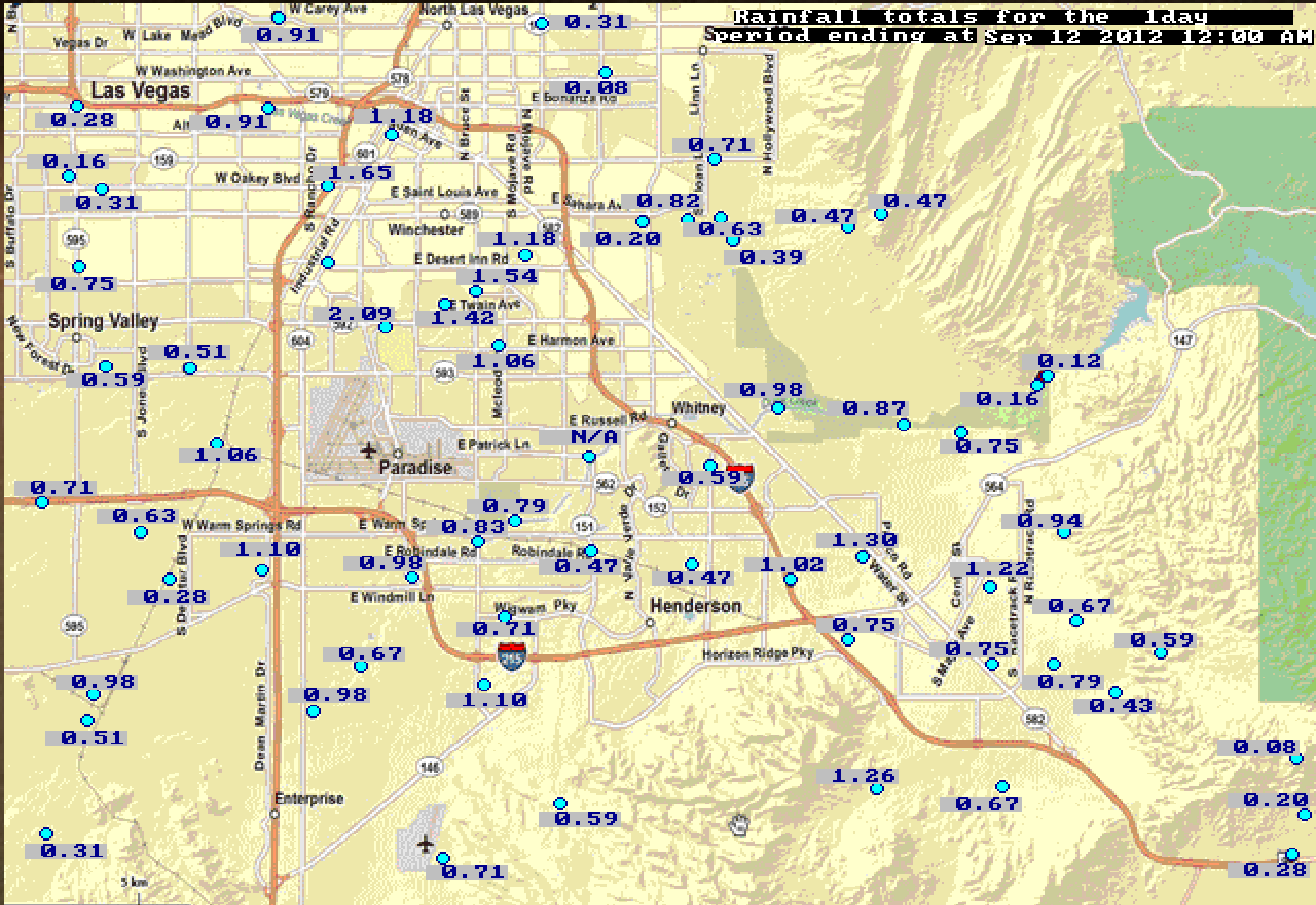


Figure10. September 11, 2012 - 1 day rainfall totals Central Las Vegas Valley (RFCDFTRS)



Figure11. September 11, 2012 - 1 day rainfall totals NW Las Vegas Valley (RFCD FTRS)



NE Clark County Rainfall (inches)

Rainfall totals for 1 day

Sep 12 2012 12:00

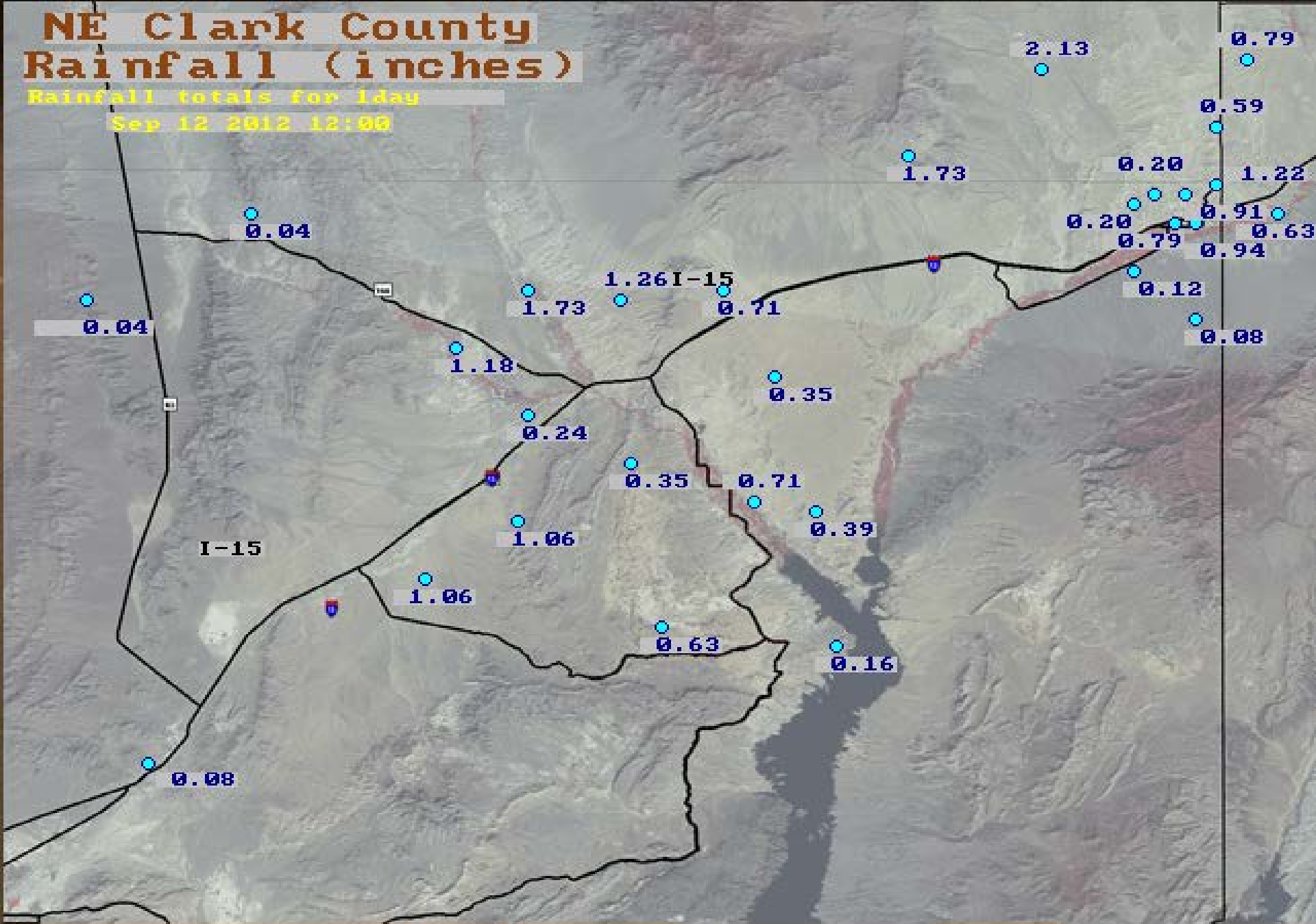


Figure 15. September 11, 2012 - 1 day rainfall totals for NE Clark County (RFCDFTRS)

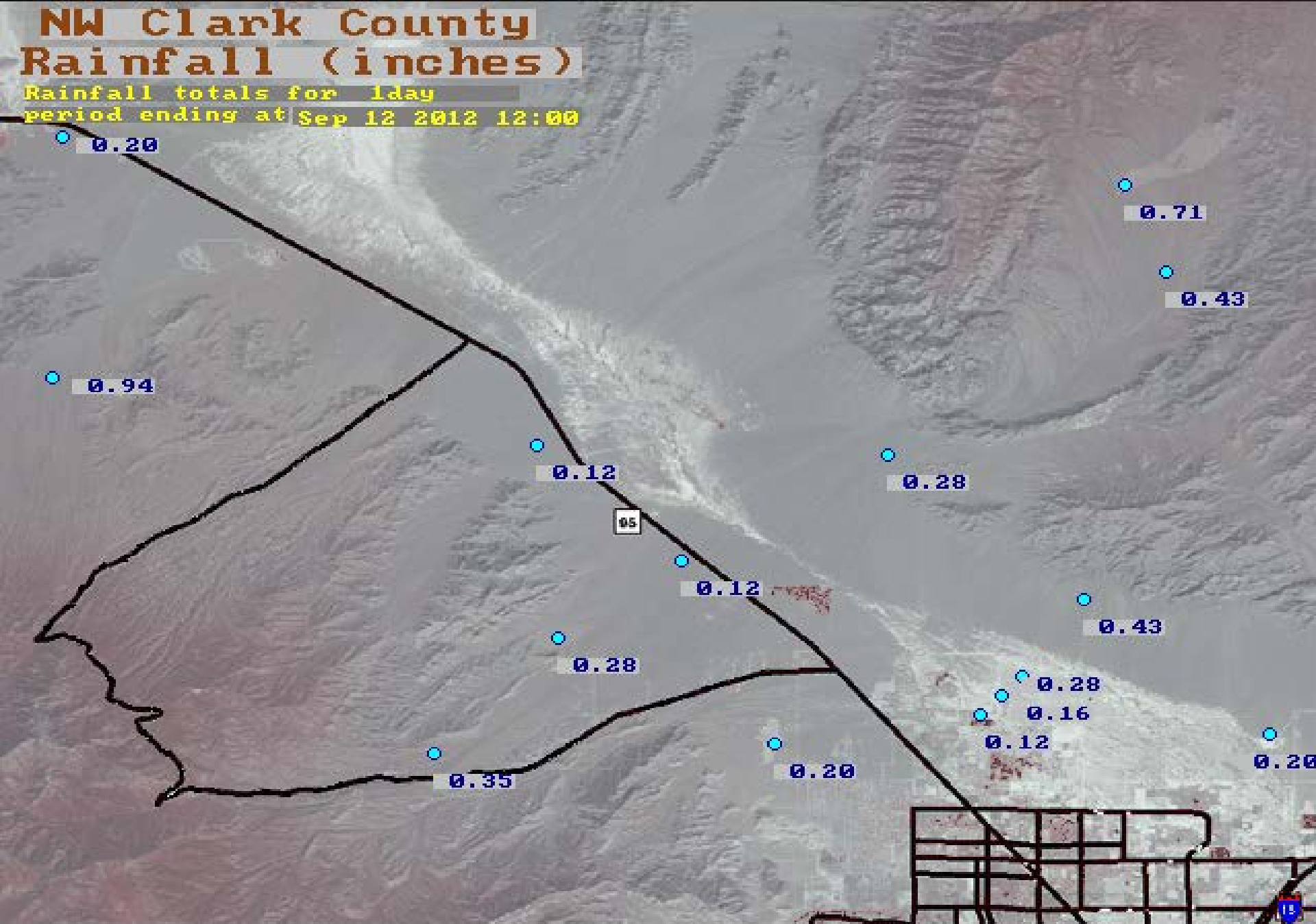


Figure 16. September 11, 2012 - 1 day rainfall totals NW Clark County (RFCDFTRS)

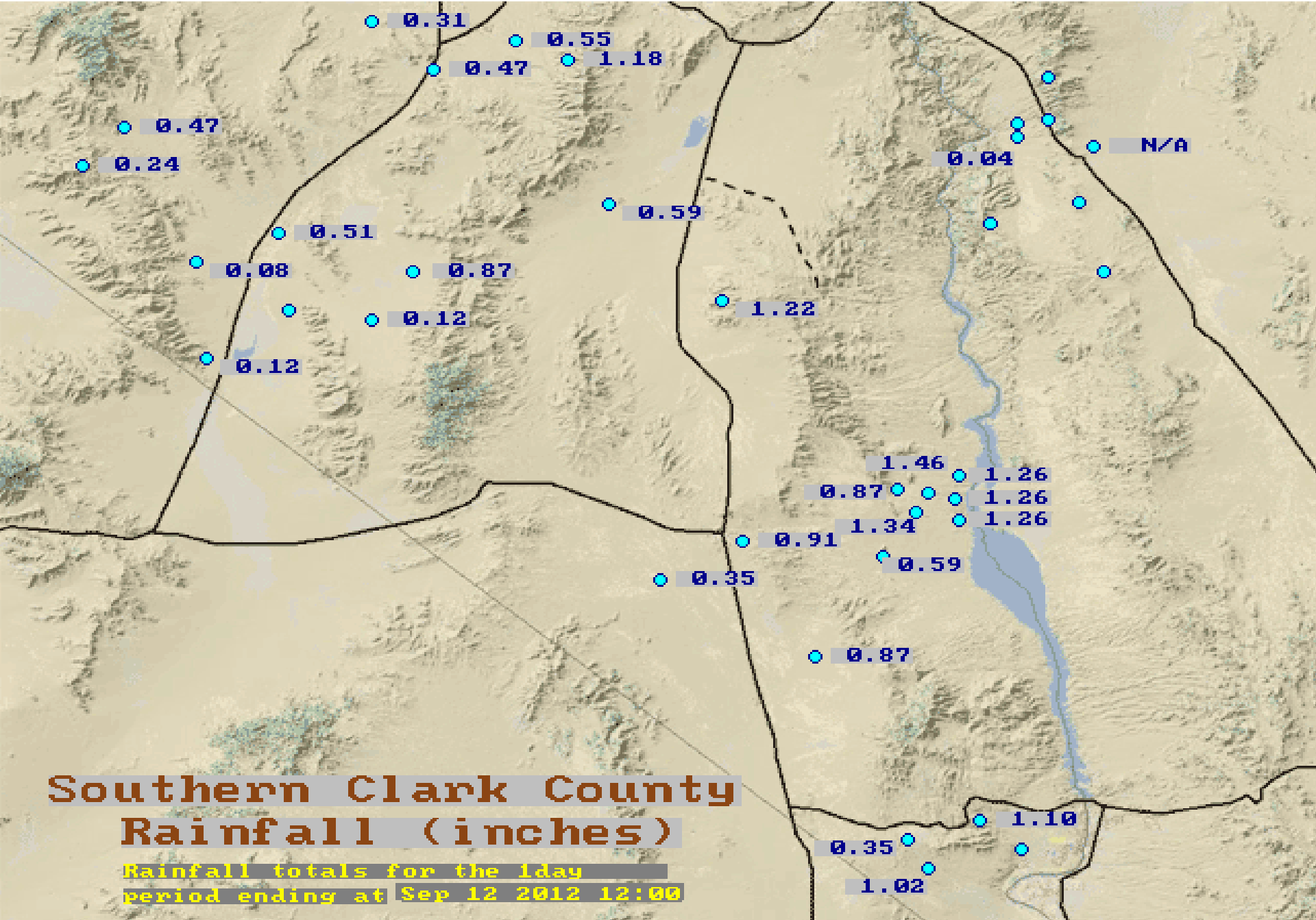


Figure 17. September 11, 2012 - 1 day rainfall totals Southern Clark County (RFCDFTRS)



Figure 18. Properties in Desert Rose Golf Course area inspected (cyan dot) and/or suffering interior/structural damages (brown triangle), September 11, 2012 (source, CCOEM)

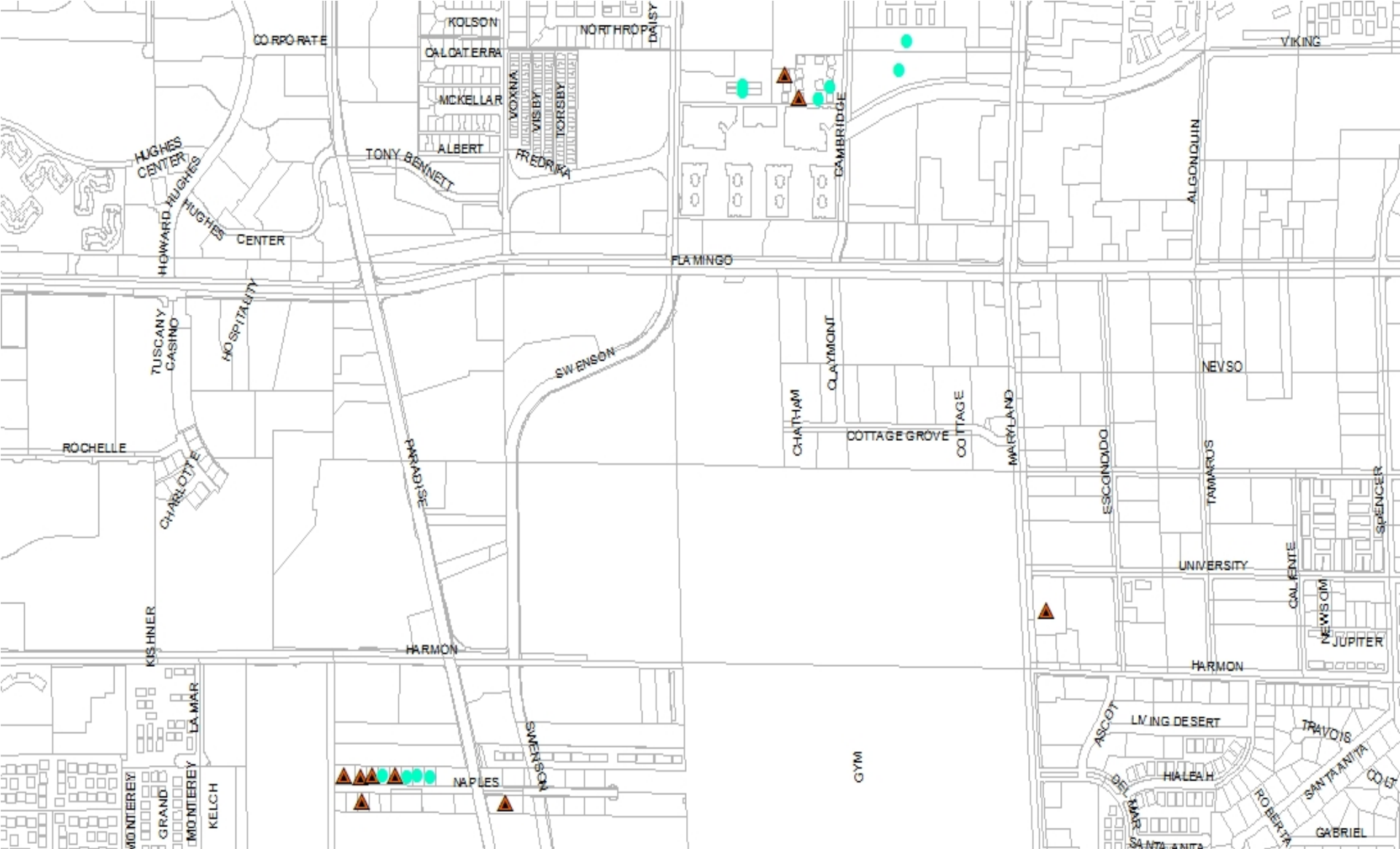


Figure 19. Properties in UNLV area inspected (cyan dot) and/or suffering interior/structural damages (brown triangle), September 11, 2012 (source, CCOEM)

A Preliminary Summary Of The September 11, 2012 Las Vegas Valley Heavy Rain And Flash Flood Event

Chris Stachelski

On the afternoon of September 11, 2012 thunderstorms producing heavy rainfall moved across much of the Las Vegas Valley. Rainfall rates of a half-inch to nearly eight-tenths of an inch in 30 minutes resulted in significant and in some cases devastating flash flooding.

The Set-Up

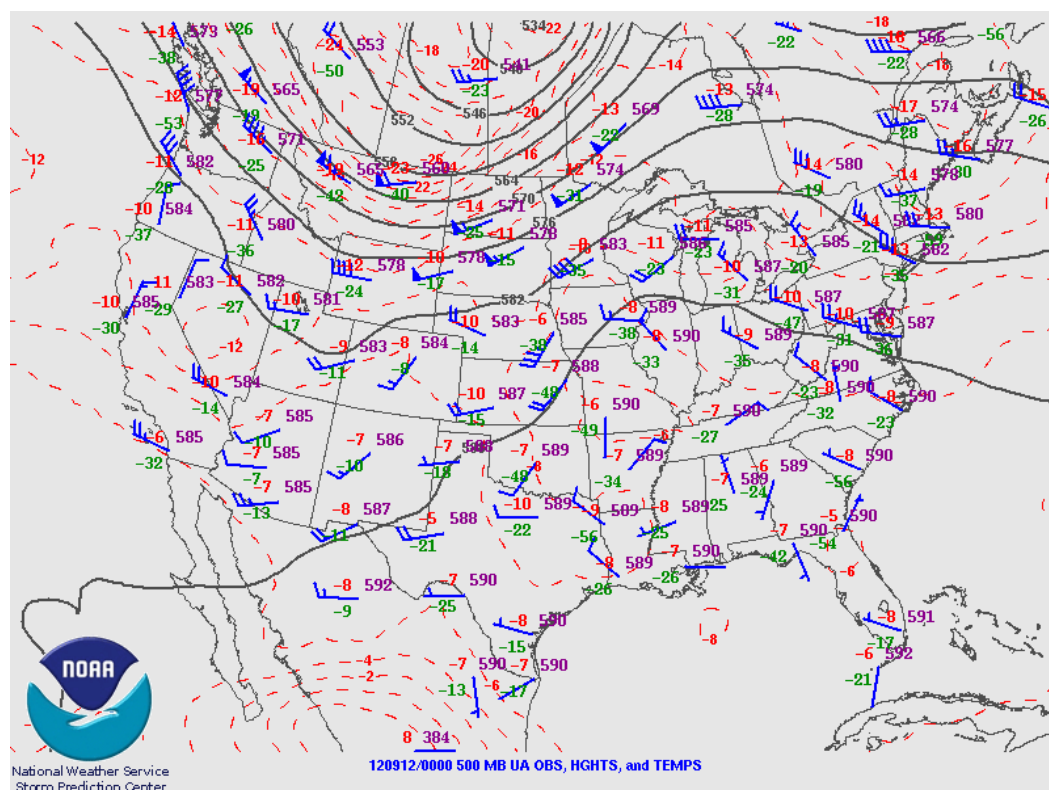
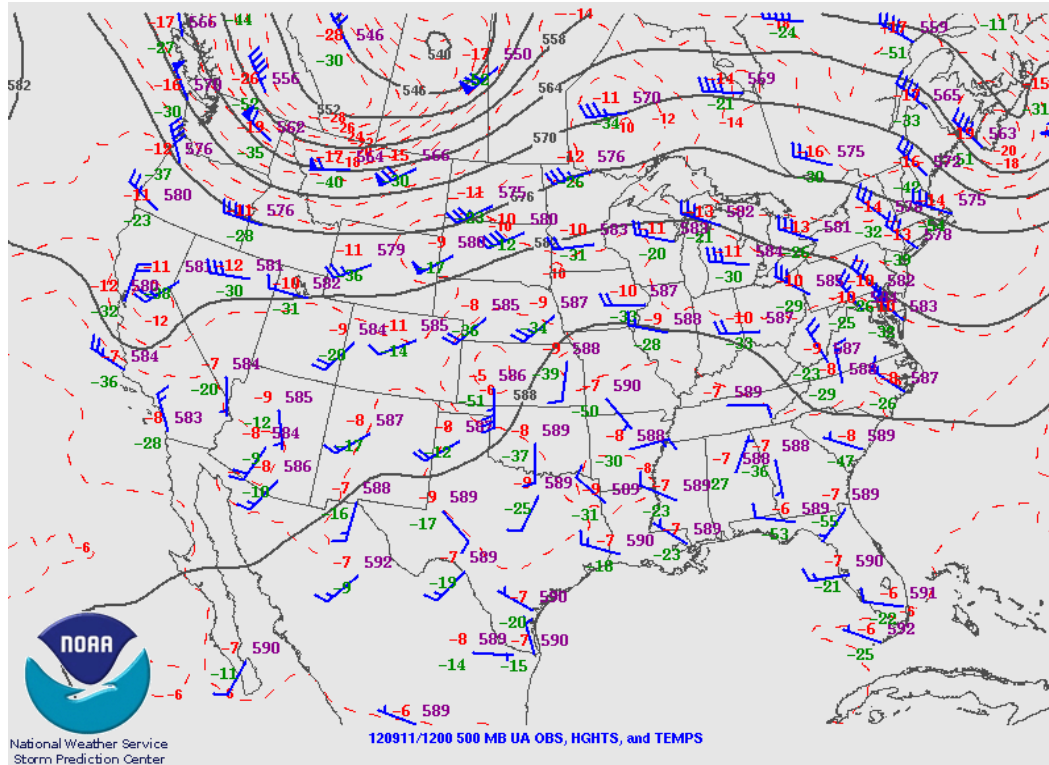
An area of low pressure was noted over central California in the mid and upper levels at 12Z on September 11th. Ahead of this low, exceptionally moist and unstable air existed over the Mojave Desert and southern Great Basin. The 12Z radiosonde launched from Las Vegas measured a precipitable water value of 1.37 inches and an 850 mb dewpoint of 11 degrees Celsius indicative of an extremely moist air mass. Precipitable water values over an inch and 850 dewpoints at or above 8 degrees Celsius are usually indicative of an atmosphere conducive to flash flooding in the Mojave Desert based on local rules of thumb. The combination of the enhanced lift from the low and a very moist atmosphere produced a set-up favorable for thunderstorms producing heavy rain. The low moved across southern Nevada between 19Z and 23Z with showers and thunderstorms ahead of it.

What Happened

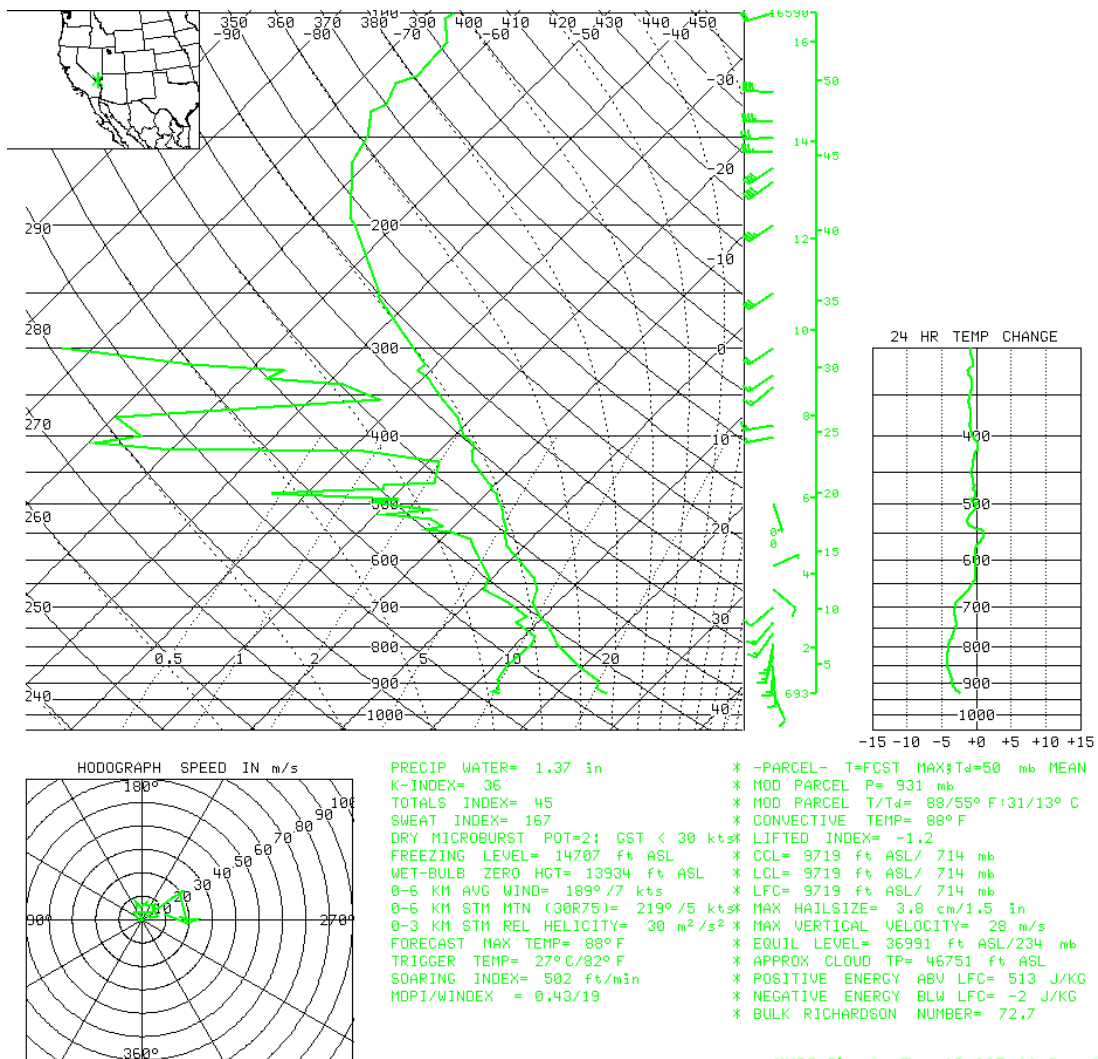
Showers and thunderstorms began to develop during the late morning hours over the Spring Mountains to the west of Las Vegas in an area where surface moisture convergence and mixing ratios were greatest. Thunderstorms over the Spring Mountains became more intense by 12:30 PM PDT as they started to approach the western foothills of the Las Vegas Valley. Around 1:00 PM PDT, one thunderstorm moved east toward the Lone Mountain area while a second moved across the far southwest part of the Las Vegas Valley roughly near Blue Diamond Road. Although the storm near Lone Mountain lost some intensity as it moved east, the storm over the far southern end of the valley maintained its intensity as it approached the center of the valley. As the initial line of thunderstorms crossed the northern portion of the Las Vegas Valley, it intensified as it crossed the area near Jones Boulevard. As the thunderstorms continued to cross the Las Vegas Valley, they developed into a more continuous line by 1:30

PM PDT with 0.5 degree reflectivity values on the Las Vegas WSR-88D radar showing at least 40dBZ along the entire length of the line and numerous areas over 50dBZ. The line of thunderstorms maintained this intensity as it moved further east across the valley. Mesoanalysis data obtained from the Storm Prediction Center showed an increase in the amount of instability and amount of available potential energy for thunderstorm development or CAPE over the eastern and southern half of the Las Vegas Valley. Lifted Index values, a measure of instability, were at least -4 over this area while CAPE values were at or well above 1000 J/Kg. This indicates thunderstorms had a very primed environment to move into and intensify. The highest reflectivity values were reached over Henderson where values in some areas exceeded 60 dBZ. As this line of higher reflectivity values moved across, it produced the majority of the rain that occurred during this event. By 3:00 PM PDT, the main line of thunderstorms had moved across the Las Vegas Valley and the heaviest rain generally ended. However, some additional rain did fall over the next two hours as showers and isolated thunderstorms moved through producing light to moderate rainfall. Rainfall ended by 4:30 PM PDT in all areas.

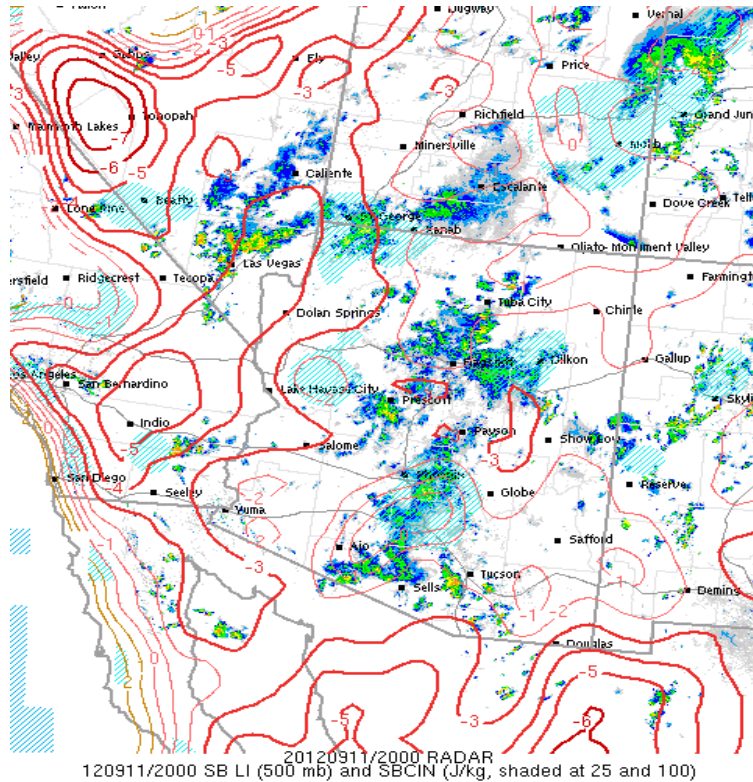
Cross sections of radar showed in general that the greatest reflectivity values were mainly centered at 5,000 feet even in cases where thunderstorm tops built to nearly 30,000 feet. This resulted in an environment where warm rain processes dominated and heavy rain fell from thunderstorms. The Specific Differential Phase (KDP) on the Las Vegas WSR-88D showed values at or above 1 deg/km in several areas across the central and southeast part of the Las Vegas Valley, especially over southeast Henderson where KDP values exceeded 6 deg/km in a small area. With KDP, higher values indicate a greater possibility that heavy rain is falling over a given area.



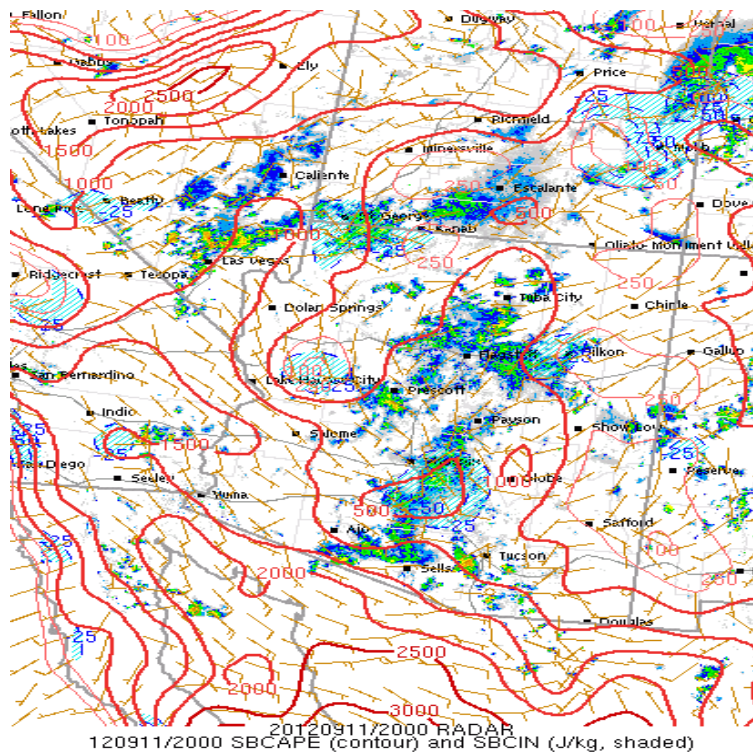
Upper air charts showing the observed values at 500 mb at 12Z on September 11, 2012 (top) and 00Z on September 12, 2012 (bottom). Blue wind barbs can be noted on both maps while solid black lines indicate height lines. Maps courtesy Storm Prediction Center.



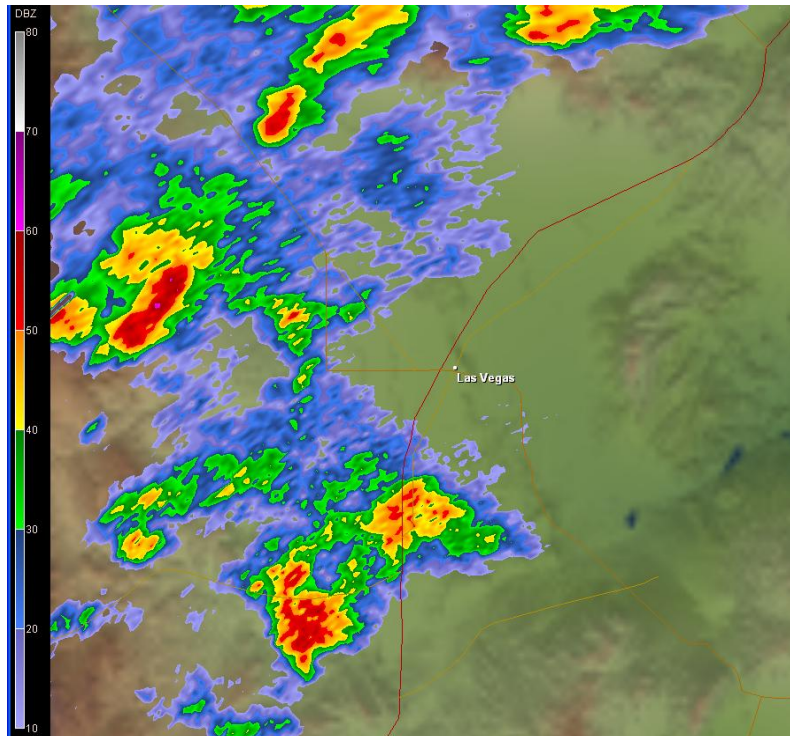
KVFF Skewt Tue 12:00Z 11-Sep-12
 12Z sounding from Las Vegas, Nevada on September 11, 2012.



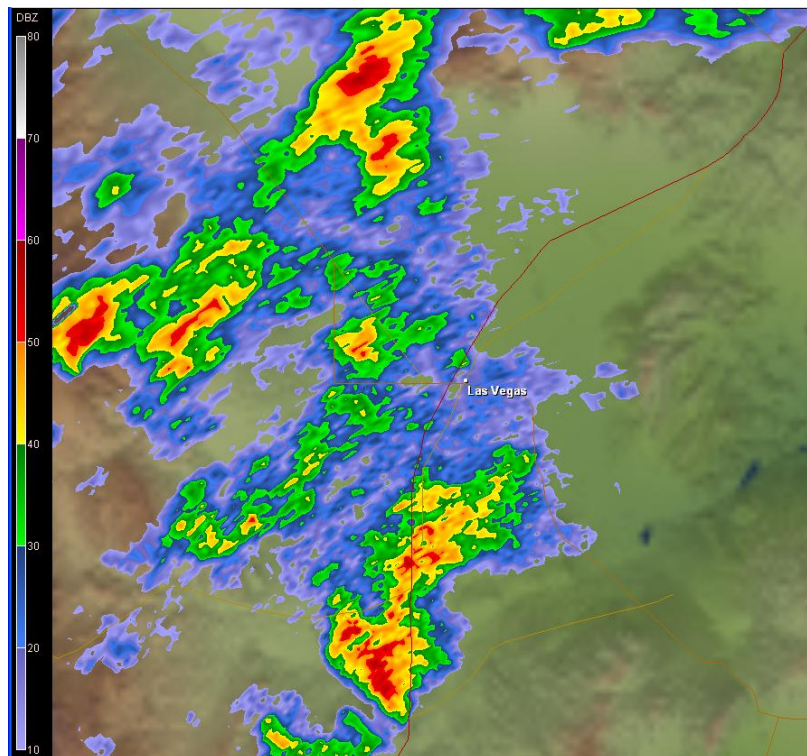
Surface based lifted indices from 20Z September 11, 2012 from the Storm Prediction Center indicated in the red lines overlaid on radar. Note the area of -4 at the time over the eastern side of the Las Vegas Valley.



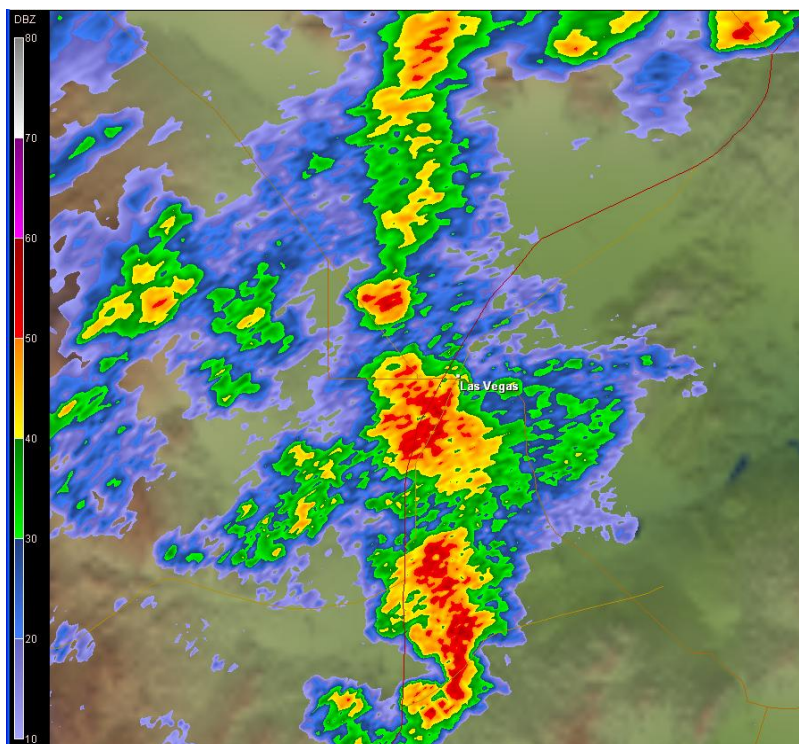
Surface based CAPE from 20Z September 11, 2012 from the Storm Prediction Center indicated in the red lines overlaid on radar.



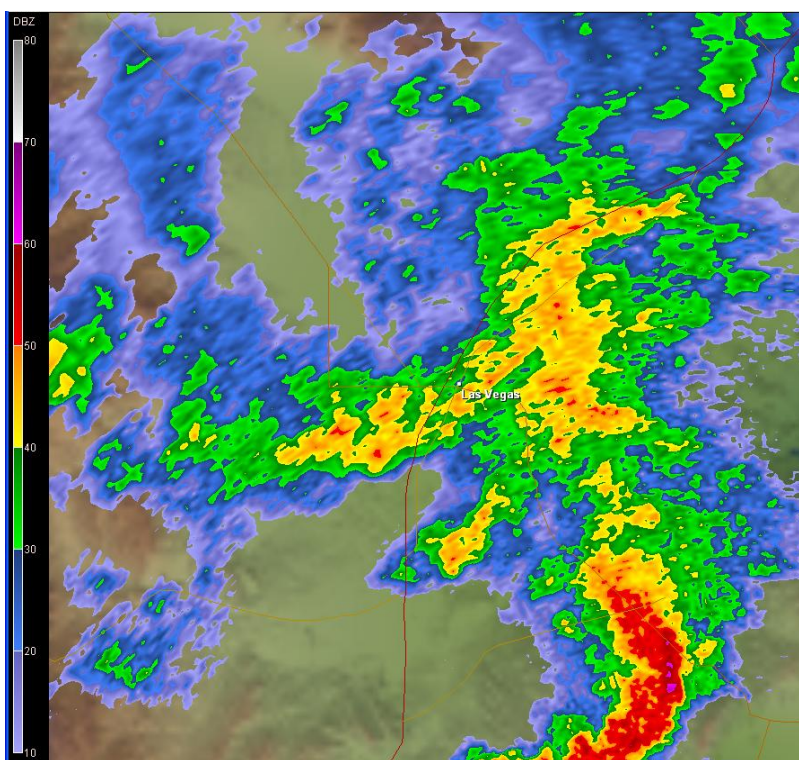
KESX 0.5 degree radar reflectivity at 2005Z on September 11th. Note the brighter colors over the western half of the Las Vegas Valley where heavier rain was falling near Lone Mountain and in the southwest.



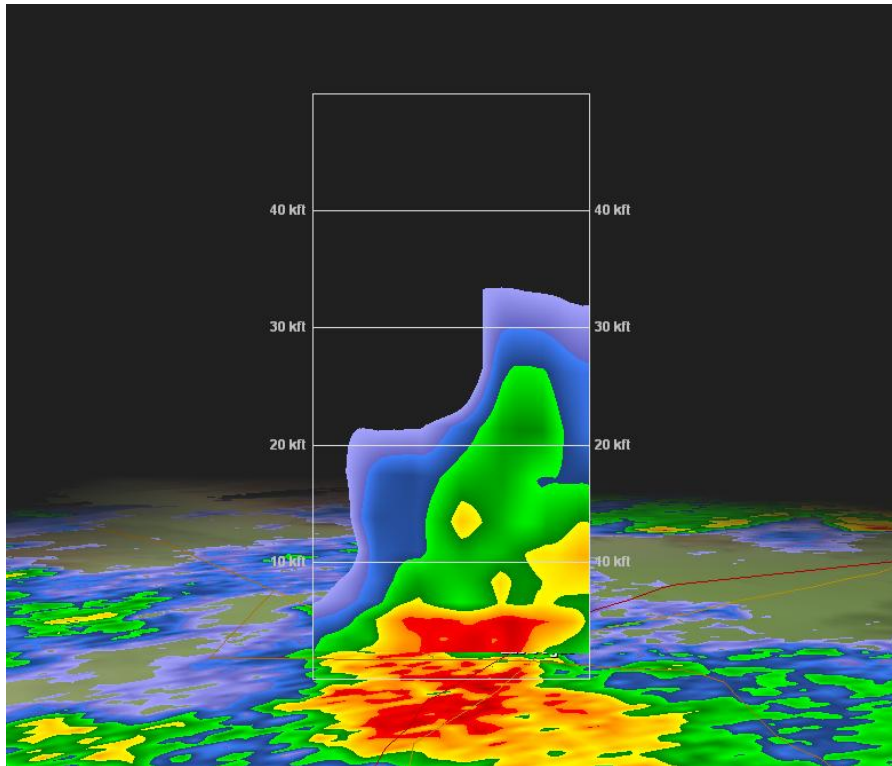
KESX 0.5 degree radar reflectivity at 2017Z on September 11th as thunderstorms started to move east across the valley.



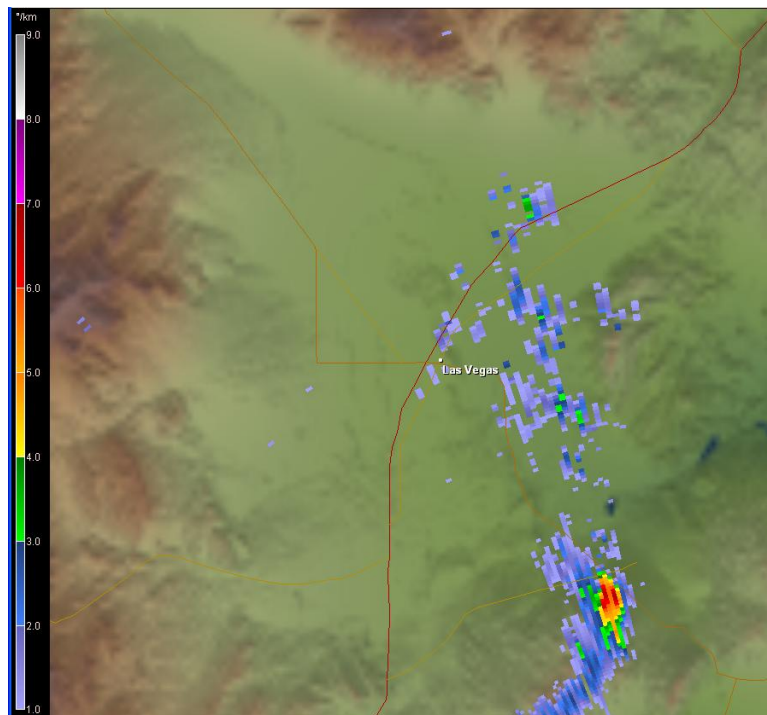
KESX 0.5 degree radar reflectivity at 2030Z on September 11th. Note the brighter colors over the center of the Las Vegas Valley and how a line of thunderstorms had started to form.



KESX 0.5 degree radar reflectivity at 2105Z on September 11th. Note the brighter colors over the eastern half of the Las Vegas Valley especially the southeast part.



Cross section of a thunderstorm over the center of the Las Vegas Valley just southwest of downtown Las Vegas near 2030Z on September 11th. Note the greatest reflectivities were around 5,000 feet even though the top of the thunderstorm reached to nearly 32,000.



KDP values from the Las Vegas weather radar at 21:01Z on September 11th. Note the area of bright colors over the southeast part of Las Vegas where values approached 6 deg/km. Values below 1.0 deg/km are not shown.

Impacts

According to local media reports, at least 50 vehicle rescues took place throughout the Las Vegas Valley by Clark County Firefighters. 40 of these were swiftwater rescues. The largest number of rescues was 15 near the intersection of Sloan and Sahara with one rescue done by helicopter. Roadway flooding was extensive with several inches to several feet of flowing water reported on many roads especially in the central and eastern parts of the Las Vegas Valley. Interstate 215 was closed from Interstate 15 to Eastern Avenue after intense rainfall washed large amounts of mud and rocks onto the highway from nearby landscaping along the side of the road. This also resulted in the Airport Connector to McCarran International Airport being closed. The Charleston Underpass flooded for the first time since extensive construction work was done to mitigate this once flood-prone area back in the mid-2000s. Several inches of water also collected on the northbound off-ramp from Interstate 15 to Highway 95 known as the 'Spaghetti Bowl' resulting in Nevada Highway Patrol detouring traffic to one lane for the evening rush hour. This resulted in extensive back-ups on northbound Interstate 15 of at least 3 miles.

Flooding was also extensive on the campus of the University of Nevada Las Vegas. Floodwaters entered the TBE Building and also flooded portions of a parking lot south of the Thomas and Mack Center where at least two dozen cars were submerged. Floodwaters also entered a nearby shopping center on Maryland Parkway damaging 10 businesses. Some businesses reported a total loss with damage to furniture and equipment. Water also entered the MGM Grand Garden Arena with about two inches of water collecting in some areas.

In downtown Las Vegas, heavy rain caused the roof of a business to cave in near Bruce and Fremont Street. In addition, rain leaked through the roof of the Clark County Regional Justice Center causing flooding. Two machines used to scan people were damaged as well as several security cameras.

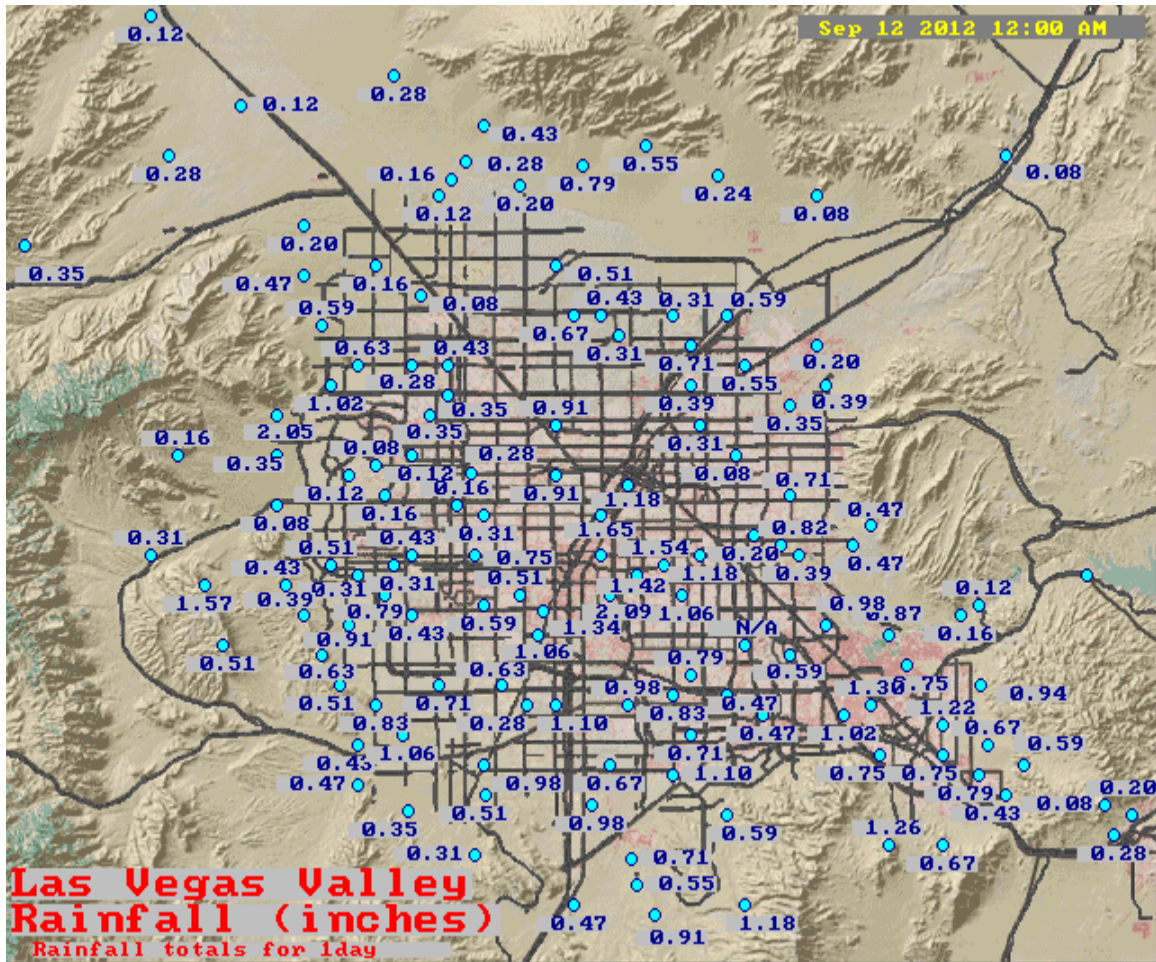
The worst impacted area though was near the Desert Rose Golf Course. At least 45 homes were flooded mainly on and near Walton Heath Avenue. Most of these homes suffered extensive damage to their lowest level with many people losing furniture and appliances. In some cases the force of floodwaters busted through concrete walls. Numerous vehicles in this area were flooded and some were floated 300 to 400 feet. Three dogs drowned to death that lived in one house. In addition, a worker at the Desert Rose Golf Course was swept away by the floodwaters from his tractor.

Several other condominiums were flooded in the eastern part of Las Vegas after floodwaters busted through a concrete wall. Arrival flights at McCarran International Airport had delays of up to one hour and forty-six minutes according to the FAA.

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. A total of 1.18 inches of rain was measured by the automated weather station at McCarran International Airport. This set an all-time record for a calendar day for the month of September breaking the old record of 1.09 inches recorded on September 25, 1939. This marked only the third time September that an inch or more of rain has fallen at the official Las Vegas climate station since records started in 1937. In addition, the total of 1.18 inches also broke the record for a 24 hour period for precipitation for the month of September breaking the previous record of 1.12 inches set on September 25-26, 1939.

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 fell in several areas. 1 to 2 inches of rain fell in northern portions of Summerlin, in and just south of downtown Las Vegas, along Flamingo Road and Tropicana Avenue from near Interstate 15 to near Mojave Road and in southeast Henderson. The highest total reported was 2.09 inches at an automated station operated by the Clark County Regional Flood Control District near Swenson Avenue and Flamingo Road by the Tropicana Wash where 2.09 inches was measured. The lowest totals were in the far northwest where under a quarter of an inch fell in areas such as Centennial Hills.



Las Vegas Valley rainfall totals from September 11, 2012 from automated weather stations operated by the Clark County Regional Flood Control District.

How Does Often Rain This Heavy Occur Historically?

Following is a table of rainfall totals for specific time intervals for McCarran International Airport. These values were obtained from climate record books on file at the National Weather Service through 1995 and then obtained from the values computed by the automated weather station which became the primary means of taking observations in September 1995. The values for September 11, 2012 rank among the greatest on record for 5 minute and 30 minute intervals. Using point precipitation estimates calculated specifically for McCarran International Airport and the 30 minute and 60 minute precipitation totals, this was roughly a 25 year rainfall event for the McCarran Airport weather station.

Date	5 Minute	10 Minute	15 Minute	30 Minute	60 Minute
7/25/1954	0.39 inch	0.68 inch	0.87 inch	0.94 inch	0.94 inch
8/4/1955	0.39 inch	0.60 inch	0.74 inch	0.82 inch	0.82 inch
7/24/1956	Unavailable	0.40 inch	0.60 inch	0.93 inch	1.25 inches
8/21/1957	Unavailable	0.33 inch	0.46 inch	0.92 inch	1.36 inches
7/25/1976	0.30 inch	0.55 inch	0.70 inch	0.95 inch	1.15 inches
7/28/1984	0.30 inch	0.59 inch	0.86 inch	1.24 inches	1.29 inches
7/8/1999	Unavailable	Unavailable	Unavailable	0.76 inch	1.05 inches
8/22/2012	0.19 inch	0.34 inch	0.40 inch	0.51 inch	0.83 inch
9/11/2012	0.30 inch	0.47 inch	0.56 inch	0.82 inch	1.04 inches

Specific time interval precipitation totals for selected heavy rainfall events at McCarran International Airport since records started in 1937.

How Does This Flood Compare To Other Flash Floods?

Based on preliminary numbers with respect to the number of homes damaged and swiftwater rescues, the flash flood of September 11, 2012 falls just short of those reported during the August 19, 2003 flash flood that took place in the northwest part of Las Vegas. However, these numbers far exceed any on record for flash floods in the Las Vegas Valley since the flash flood of August 19, 2003. Although a numerical dollar estimate of damages from this flash flood are not yet available, it is reasonable to conclude this was the worst flash flood in the Las Vegas Valley in nearly 10 years based on the number of swiftwater rescues and homes damaged during this flash flood.

As shown in the previous table, rainfall totals in short duration time periods of 30 minutes or less from this event were as high as several previous events at the weather station at McCarran International Airport. Many of these other events did produce higher storm totals. However, the intensity of the rain in a period of 30 minutes or less with this event was a large factor in why flooding took place as quickly as it did. The rain just ran off quickly from where it fell.

Another large factor that resulted in flooding with this event was where the heaviest rain fell. This event produced heavy rain in several areas of the valley,

including in the higher elevations of the west side which ultimately drains east. Additionally heavy rain fell in areas right along the Flamingo and Tropicana Washes which resulted in a rapid influx of water into both of these. In addition as heavy rain fell over the central portion of the Las Vegas Valley, this combined with runoff from any rain that fell further west helped to create rapid flows in washes and sent additional water toward the east side of the valley where the natural drainage flow ultimately sends water. Therefore on the east side of the valley, flooding resulted from a combination of heavy rain that fell over this area plus additional water that ran down washes and the natural drainage system from the west.

Lastly, many areas that saw the heaviest rain are areas of the Las Vegas Valley where the flood control system is not as developed. In some areas, such as the Charleston Underpass, even though improvements were made, the intensity of the rain was likely greater than what the design was able to handle.



Flooding in the parking lot of UNLV. Photo courtesy: KLAS-TV/Las Vegas.



Las Vegas Wash one mile south of Vegas Valley Drive. Photo Courtesy: D. Stoltz.