

# **Rainfall & Flood Event Report**

## **September 8, 2014**

prepared by  
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Tropical moisture associated with Hurricane Norbert generated intense rainfall over large areas of Clark County September 7-8, 2014. Localized rainfall resulted in debris deposits on public roadways in Sandy Valley, the southwest sector of the Las Vegas Valley and Moapa during the afternoon and evening of September 7. These same areas experienced significantly greater rainfall and flooding on the afternoon of September 8. The hardest hit area was Moapa Valley, both north and south of I-15, including the towns of Moapa, Logandale and Overton, as well as the Moapa River Indian Reservation. Rainfall over a large area that drains to the Muddy River, Meadow Valley Wash and Weiser Wash ranged from 2.5" to 4.6" as measured by automatic rain gages operated and maintained by the Regional Flood Control District; the National Weather Service's radar estimated rainfall totals in excess of 6" over parts of this area. The rainfall generated sizeable flows in the local washes and exceeded the capacity of the I-15 drainage system. Large sections of I-15 near mile marker 92 suffered major damages which resulted in the highway being closed to traffic for several days while repairs were implemented.

The National Weather Service (NWS) recognized the potential for Hurricane Norbert to push substantial amounts of moisture into the Clark County area and initiated outreach efforts on September 3rd. Their efforts included an informational briefing with local emergency responders on September 5<sup>th</sup>, and the local office of the NWS issued a Flash Flood Watch for the September 7-8 period later that afternoon. Several Flash Flood Warnings were issued during the afternoon of September 7<sup>th</sup> owing to conditions in Sandy Valley, Goodsprings and the west side of the Las Vegas Valley. The NWS continued to ramp up their concern regarding the possibility of severe thunderstorms and flash flooding on September 8<sup>th</sup>, issuing the first Flood Advisory for Clark County at 9AM. Shortly after mid-day, the NWS issued a Flash Flood Warning for southwest Las Vegas Valley, and at 1:20PM a Flash Flood Warning for the Moapa area was issued.

Intense rainfall began in the southwest part of the Las Vegas Valley at 12:30PM on September 8 and moved across the urban area to the northeast. During this event, ten Flood Threat Recognition System (FTRS) rain gages in the southwest and west portions of the Valley measured more than one-inch of rainfall. There were reports of localized street flooding as a result of the rainfall as well as the need for several swift water rescues. The flood control detention and debris basins in that area captured a significant volume of runoff as did the channel network. Table 1 presents a summary of the volume of storm runoff captured by the detention and debris basins.

Rainfall quickly spread to areas outside of the Las Vegas Valley and intensified. Based on weather radar and data reported by the District's FTRS, District staff alerted Nevada Department of Transportation (NDOT) to the possibility of runoff across US-95 northwest of Las Vegas, and

across US-93 in the Coyote Springs area. As the rainfall continued to intensify in a large area north of Moapa, District staff alerted other agencies to the possibility of significant runoff in the Muddy River.

At approximately 2:40PM the NWS contacted the District regarding a report they had received of a dam north of the Moapa River Indian Reservation that was within a few inches of over-topping, and to advise that the Moapa tribal police were beginning to evacuate downstream properties on the reservation. According to the State Department of Water Resources' database, this dam is a Bureau of Indian Affairs facility. At some point during this event the dam did fail and released an unknown volume of water. There were no known injuries resulting from this failure, and it is believed that the flow mainly impacted fields and dirt roadways. A post-event inspection of this facility indicated that the berm was not over-topped and that the failure was likely due to internal erosion.

Runoff from this large storm event resulted in significant flow across several major roadways and closure of those roadways for varying amounts of time. These roadways include:

- US-95 near Nevada/California border
- US-95 between Lee Canyon Road and Paiute Drive (Snow Mountain exit)
- US-93 between mile markers 78-80
- SR-168 between I-15 and US-93
- I-15 near mile marker 92
- I-15 through the Virgin River Gorge (Arizona)

Flow in Weiser Wash caused extensive damage to approximately 2 miles of travel lanes and the median of I-15 near mile marker 92. The US Geological Survey (USGS) preliminary estimate of the flow in Weiser Wash upstream of I-15 is 12000 cfs (subject to change). Several vehicles were washed off of the roadway. This roadway was closed to all travel in both directions until September 12 while it was repaired.

There were also reports that Union Pacific Railroad service between Salt Lake City and Las Vegas was suspended while crews repaired track near Moapa that was undermined and washed out by the flooding.

Downstream of I-15, flood flows in the Muddy River severely eroded the Logandale Levee, located immediately below the Wells Siding Diversion. While this levee did not fail and was not over-topped, it did suffer considerable damages. The USGS preliminary estimate for flow in the Muddy River upstream of the Wells Siding Diversion is ~~11-16000 cfs~~ 17300 cfs +/- 25%<sup>1</sup> (subject to change). The adopted 100-year regulatory discharge for the Muddy River is 21400 cfs.

According to a news release from the Clark County Office of Public Communications, damage assessment teams identified 91 homes in Moapa and on the Moapa River Indian Reservation with some degree of damage, and another 48 homes in the Logandale and Overton areas. The Clark County Department of Public Works estimated damages in excess of \$1 million to County maintained roadways as a result of the September 8 event. NDOT estimated \$5 million in

damages to I-15. Following this event, both the Governor's office and the Clark County Commission declared a state of emergency.

In the Las Vegas Valley, a 50 foot length of concrete wall in the F-4 Channel upstream of Jerry Tarkanian Drive collapsed. An adjoining segment of similar size was also damaged. It is believed that sheet flow entering over the side of the channel might have caused this collapse. There were no injuries or flooding of downstream or neighboring properties known to have occurred as a result of this failure.

Table 2 presents the peak rainfall intensities for FTRS rain gages in the area north of Moapa. Measured rainfall amounts at several of these sites exceeded the rainfall standard adopted by the District and local governmental entities for the design of drainage infrastructure in the Clark County area. Based on the NWS radar data for this event, the rainfall total for a 30 square mile area in the vicinity of Moapa may have exceeded 6 inches. Flood flows in the Moapa Valley are believed to have been the largest since 1981.

As additional and updated information becomes available, the copy of this report posted on the District's web-site ([www.regionalflood.org](http://www.regionalflood.org)) will be updated.

<sup>1</sup> Discharge estimate changed 3-6-2015 to reflect the best and most current information available from the US Geological Survey.

**Table 1. Maximum Depth and associated Storage Volumes**

<u>Facility Name</u>	<u>Max Depth</u>	<u>Volume</u>
Blue Diamond DB	16 feet	180 acre-feet
F-1 Debris Basin	14.3 feet	20 acre-feet
F-2 Debris Basin	9.2 feet	10 acre-feet
Tropicana DB	29.5 feet	460 acre-feet
Lower Flamingo DB	14 feet	150 acre-feet

**Table 2. Peak Rainfall Intensities (all units are inches)  
September 8, 2014**

<u>Stn ID</u>	<u>5 min.</u>	<u>10 min.</u>	<u>15 min.</u>	<u>30 min.</u>	<u>1 hr.</u>	<u>2 hrs.</u>	<u>3 hrs.</u>	<u>TOTAL</u>
<b>3044</b>	0.35	0.59	0.75	1.26	1.65	1.93	2.05	<b>2.05</b>
<b>3064</b>	0.47	0.87	1.26	2.16	3.34	4.08	4.63	<b>4.67</b>
<b>3184</b>	0.35	0.55	0.87	1.42	2.13	2.60	3.07	<b>3.35</b>
<b>3214</b>	0.44	0.79	1.10	1.61	2.52	2.84	2.99	<b>3.15</b>
<b>3234</b>	0.43	0.71	0.83	1.02	1.14	1.22	1.34	<b>1.42</b>
<b>3264</b>	0.32	0.52	0.71	0.87	1.54	2.36	2.52	<b>2.60</b>
<b>3384</b>	0.31	0.47	0.55	0.91	1.65	2.24	2.60	<b>2.91</b>
<b>SDN3</b>	<b>0.33</b>	<b>0.58</b>	<b>0.83</b>	<b>1.19</b>	<b>1.54</b>	<b>1.92</b>	<b>2.16</b>	

3044	Mormon Mesa 1
3064	Weiser Wash
3184	California Wash 2
3214	Elbow Canyon
3234	Wildcat Wash
3264	Muddy River near Moapa
3384	Meadow Valley Wash
SDN3	Storm Distribution Number 3, 100-yr design storm used for design of drainage infrastructure in Las Vegas Valley

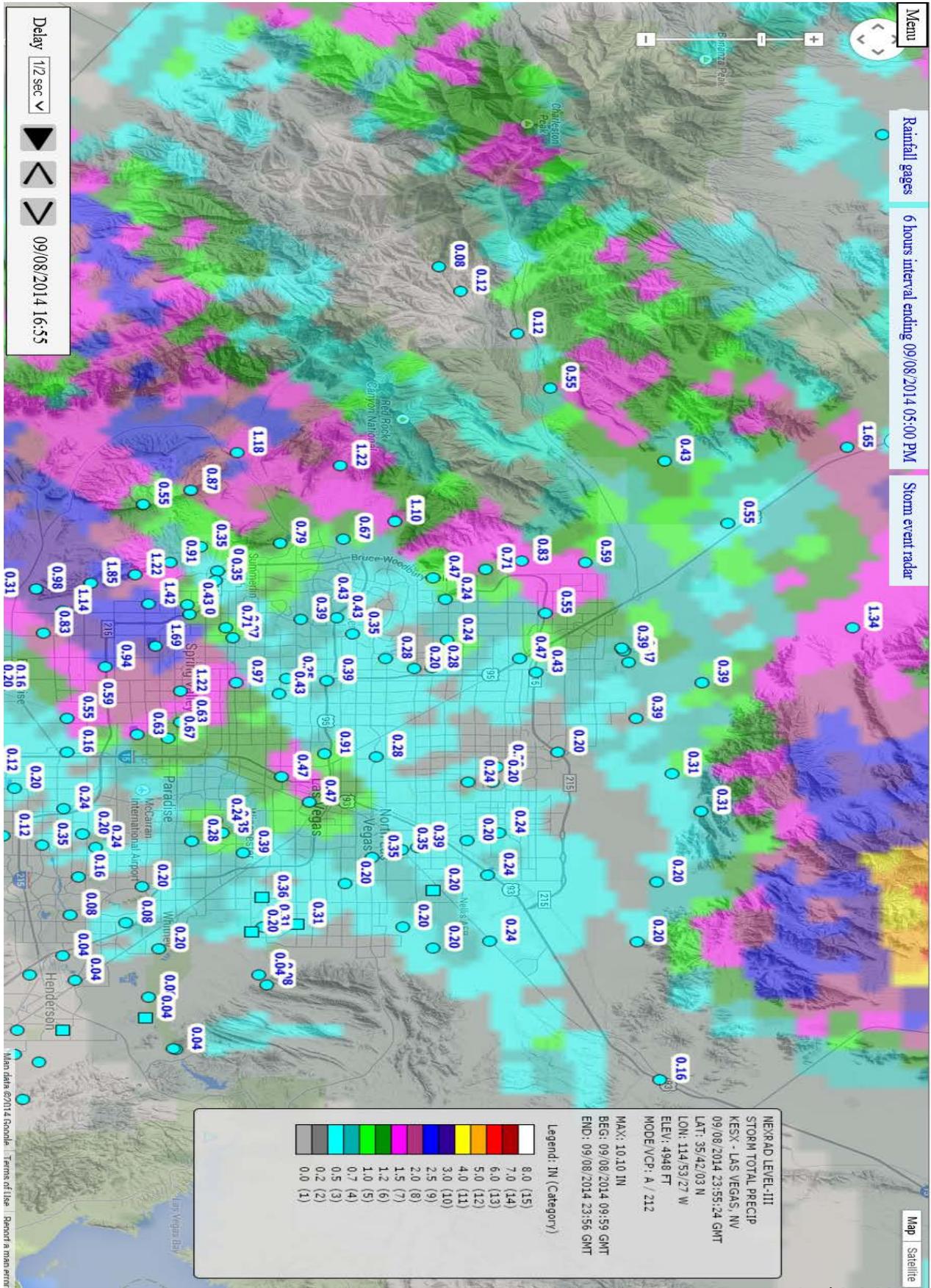


Figure 1. Total Storm Rainfall totals for Las Vegas Valley, September 7, 2014

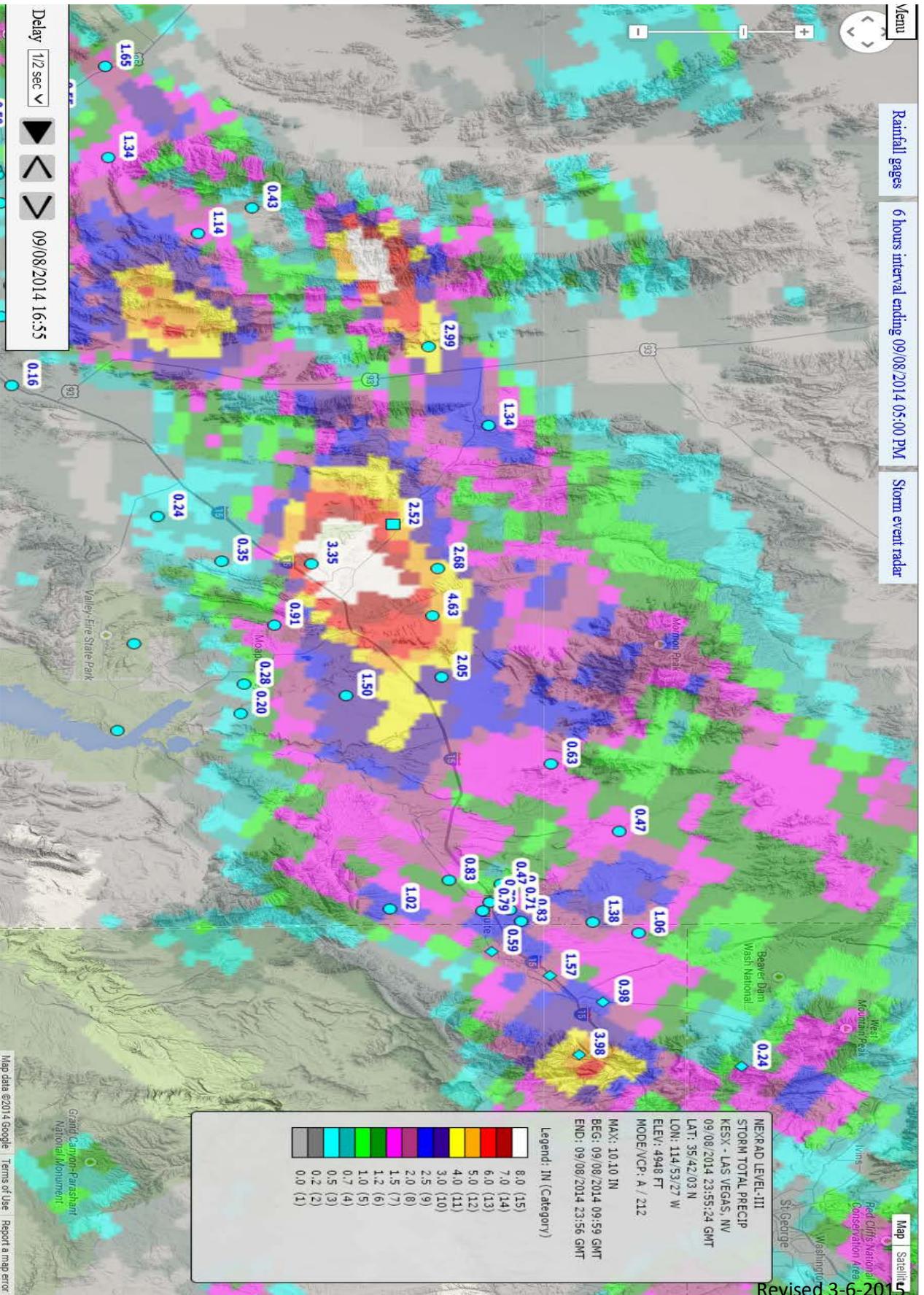


Figure 2. Total Storm Rainfall values for Moapa area, September 7, 2014



**Figure 3. Damage to I-15 near mile marker 92, September 8, 2014**



**Figure 4. Damage to I-15 near mile marker 92, September 8, 2014**



**Figure 5. Damage to I-15 near mile marker 92, September 8, 2014**



**Figure 6. Damage to I-15 near mile marker 92, September 8, 2014**



**Figure 7. Damage to F-4 Channel**



**Figure 8. Logandale Levee**