MEMORANDUM

Date: August 26, 2021

To: The Honorable Chair and Members  
Pima County Board of Supervisors

From: C.H. Huckelberry  
County Administrator

Re: Report on Flooding in the Sahuarita Area

Given the record monsoon rainfall in July, very limited flood damage occurred throughout Pima County. The most severe damage occurred in the Town of Sahuarita related to what is known as Drainageway 1 at Duval Road and Abrego Drive.

The attached report and photographs demonstrate the extent of flooding, flood damages and the maintenance work accomplished to restore stormwater flow and flood capacity of the culvert and upstream and downstream drainageway.

CHH/anc

Attachment

c: Jan Lesher, Chief Deputy County Administrator  
Carmine DeBonis, Jr., Deputy County Administrator for Public Works  
Francisco García, MD, MPH, Deputy County Administrator & Chief Medical Officer, Health and Community Services  
Suzanne Shields, Director, Regional Flood Control District
DATE: August 23, 2021

TO: Carmine DeBonis, Jr.
    Deputy County Administrator – Public Works

FROM: Suzanne Shields, P.E.
      Director

SUBJECT: Flooding along Drainageway #1 and Abrego Drive in Sahuarita and Green Valley on July 22 and 24, 2021

There were two significant storms in the Sahuarita and Green Valley area on July 22 and 24, 2021. Most of the storm damages were related to strong winds; however, buildings and roads were flooded along Drainageway #1 at Duval Road and Abrego Drive. Rainfall report totals in the nearby watersheds ranged from 1.5 to 1.95 inches on July 22nd and from 2.7 to 5.5 inches on July 24th. Attached is a report on these storm events, associated flooding, and flood responses.

Flood waters initially broke out of Drainageway #1 and flowed down Duval Road. The major flooding occurred when the drop inlet culvert at Abrego Drive was clogged with sediment causing flood waters to over top the road flooding the downstream neighborhoods along both sides of Drainageway #1.

The Regional Flood Control District provided assistance to the Town of Sahuarita by clearing sediment from the culvert at Abrego Drive and the downstream channel. By August 19th, the culvert and channel were cleared of sediment and debris. Roll-off dumpsters were provided to the residents to aid in disposal of water damaged property.

Please let me know if you have any questions.

SS/tj

Attachment

c: C. H. Huckleberry, County Administrator
    Eric Shepp, P.E., Deputy Director – Regional Flood Control District
    Andy Dinauer, P.E., Deputy Director – Regional Flood Control District
    Brian Jones, Division Manager – Regional Flood Control District
Details of the Storm and Flood Event

In the overnight hours of Saturday, July 24, 2021, a powerful storm cell in Green Valley overwhelmed Green Valley Drainageway #1 and flooded homes near the intersection of Abrego Drive and Duval Road.

Written communication on 8/18/21 from Shanna Sellers, HOA President for La Joya III stated that the area had flooded previously on Thursday, July 22, 2021. It was reported that the July 22 storm deposited sediment in the La Joya Verde III subdivision, and that the Town of Sahuarita performed some clean-up efforts on Avenida Mena on Friday the 23rd.

The District does not have any rainfall or streamflow gages in this watershed, but nearby rainfall reports from Rainlog.org in nearby watersheds range from 1.5” to 1.95” on July 22nd and from 2.7” to 5.5” July 24th. These are daily totals and thus can’t be used to establish rainfall intensity. Radar estimated precipitation estimates for July 24th and 25th are provided below. The 100-year 24-hour rainfall for this area is 4.27”. A detailed analysis of radar return data would be necessary to determine the return interval of the storms.

The area of inundation north of Drainageway #1 largely matched an existing conditions floodplain delineation included in a report titled Green Valley Drainageways Basin Management Study written for the District by CMG Drainage Engineering, Inc. dated 6/27/2014. The report noted significant sedimentation within the drainageway and modeled the floodplain in that condition. The floodplain delineation did not show flooding impacting structures south of the drainageway.

After the flood event, District staff observed that flow appeared to have broken out of the channel to the south at two locations. The upstream most breakout occurred between I-19 and 79 E Duval Road. Water appears to have broken out of the channel and flowed east down Duval Road. The downstream break out occurred at the 4 cell box culvert under Abrego Drive. Post flood observations noted that the culverts were completely obstructed. Since flow was unable to pass through the culverts, flow came out of the channel to the north and to the south. The flows to the south apparently flowed down the utility easement to the north of Madera Canyon Townhomes and entered that subdivision.

1 Excerpt from Figure 5 from Green Valley Drainageways Basin Management Study showing the floodplain based on existing conditions in 2014.
Map showing an approximate delineation of the area inundated by the flood event. Red dots indicate structures that either were either confirmed to have flooded or may have flooded based on field observations.


Radar based 24-hour Quantitative Precipitation Estimate for July 24, 2021.

Impacts of the Flood Event

The hardest hit homes were in Madera Canyon Townhomes on Via Terrenal. These homes are in unincorporated Pima County. Several homes had 4-6 inches of water inside. It appeared that other homes also had water inside. Many homes had flooded garages. In addition to flooding, a large volume of sediment was deposited within the subdivision. Some areas experienced perhaps as much as a couple of feet of deposition up against homes. Some gas meters were mostly buried in sediment.

6 Post-flood photo of Madera Canyon Townhomes. Note damaged garage door.

7 Muddy street in Madera Canyon Townhomes.

8 Partially buried gas meter.
Photo showing sediment deposition against a home in Madera Canyon Townhomes.

Photo showing normal height of window above grade without deposition.
The Green Valley Animal Hospital at the southwest corner of Abrego Drive and Duval Road (220 E Duval Road), also in unincorporated Pima County, was flooded inside with approximately 1 inch of water.

Homes within the Town of Sahuarita north of the Duval Road alignment also flooded. Most of the flooded homes in the Town experienced flooding of garages, but not in the habitable portion of the home. There were some reports of water seeping into homes through doorways, but not fully flooded floors.

Sediment was deposited against the home closest to the outlet of the box culverts on the north side of the drainageway (2041 N Avenida Tabica), apparently causing the wall to bow inward. The owner of 2051 N Avenida Tabica reported that flood waters got to within 10” of the top of the wall on July 24th. The wall is 4 feet 8” tall.
Flood waters entered the garage at 2048 N Avenida Mena on Thursday the 22nd, and would have gotten in on the 24th had they not sandbagged.

In the course of investigating possible causes for flow coming out of the channel of Drainageway #1, District staff also observed flooding and spoke with flooded homeowners in the Town of Sahuarita on East Duval Road.

The following homes/businesses were reported to have flooded. It is likely that additional homes flooded but were not reported to the District as having flooded (see map below).

- Green Valley Animal Hospital 220 E Duval Road (1” of water in business)
- 374 E Via Terrenal (4-6” of water/mud in home)
- 375 E Via Terrenal (6-8” of water/mud in home)
- 376 E Via Terrenal (4-6” of water/mud in home)
- 377 E Via Terrenal (4-6” of water/mud in home)
- 378 E Via Terrenal (4-6” of water/mud in home)
- 379 E Via Terrenal (4-6” of water/mud in home)
- 380 E Via Terrenal (4-6” of water/mud in home)
- 381 E Via Terrenal (4-6” of water/mud in home)
- 2048 N Avenida Mena (garage partially flooded)
- 2056 N Avenida Mena (4-6” of water in home)
Maintenance Responsibilities

The drainageway upstream of the box culverts under Abrego Drive is the responsibility of the HOA per the plat for La Joya Verde Rancho Abrego III (Map 63, Page 38).

Pima County DOT confirmed that maintenance of the culverts and the drainage within the road right-of-way is the responsibility of the Town of Sahuarita.

Maintenance responsibility for the drainageway east of Abrego Drive appears to be mixed. Sheet 4 of 5 of the plat for La Joya Verde III (Map 57, Page 77) shows a public drainage easement across the southern 100 feet of the common area (Common Area C), but where the culverts outlet and part of the channel immediately downstream of the outlet is north of the public drainage easement in what appears to be Common Area B and thus subject to HOA maintenance. The District has recommended to both the HOA and the Town of Sahuarita that this situation isn’t ideal and that it would be optimal if the Town assumes maintenance of the entire channel downstream of Abrego Drive.
16 Upstream side of the box culverts under Abrego Drive following the flood event on July 25, 2021.

Pre-flood Conditions
Little is known about the condition of the drainageway immediately prior to the storm event. The following are excerpts from report titled Green Valley Drainageways Basin Management Study written for the District by CMG Drainage Engineering, Inc. dated 6/27/2014 (highlight added).

Table 7 - Bank Erosion, Degradation and Sediment Deposition Problem Locations

<table>
<thead>
<tr>
<th>DW#</th>
<th>Location</th>
<th>Priority Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abrego Drive</td>
<td>High</td>
<td>Remove sediment deposits, provide downstream grade out channel. This culvert is within the Town of Sahuarita.</td>
</tr>
<tr>
<td>4</td>
<td>East of Via Alamosa</td>
<td>Moderate</td>
<td>Remove sediment deposits (ref. Appendix M DW#4-Photo 4)</td>
</tr>
<tr>
<td>7</td>
<td>West of Abrego Dr.</td>
<td>High</td>
<td>Exposed Utility lines crossing wash (ref. Appendix M DW#7-Photos 16-17 &amp; 20-22). Utility lines should be reinstalled below existing thalweg and grade control structures installed.</td>
</tr>
<tr>
<td>9</td>
<td>Downstream of Portillo Hills</td>
<td>Moderate</td>
<td>Bank erosion and degradation undercutting existing petro-flex. Provide grade controls to arrest degradation. Repair bank protection</td>
</tr>
</tbody>
</table>

Table 8 – Undersized Roadway Culverts

<table>
<thead>
<tr>
<th>DW#</th>
<th>Location</th>
<th>Priority Level</th>
<th>Modifications to achieve All-Weather Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abrego Drive 4-10’x4’ RCBC (Town of Sahuarita Responsibility)</td>
<td>High</td>
<td>Culvert 80% blocked by sediment. Remove sediment, lower downstream invert + 4 feet and channelize downstream to prevent culvert deposition. Add 1-10’x4’ cell (Culvert located within Town of Sahuarita)</td>
</tr>
<tr>
<td>7</td>
<td>Esperanza Blvd. 3-48”x36” ACMP</td>
<td>High</td>
<td>Add 4-48”x36” ACMP or replace with 2-10’x4’ RCBC.</td>
</tr>
<tr>
<td>8</td>
<td>I-19 1-6’x4’ RCBC</td>
<td>Moderate</td>
<td>Add 2-6’x4’ RCBC</td>
</tr>
<tr>
<td>9</td>
<td>Camino del Poso 4-36” CMP</td>
<td>Moderate</td>
<td>Replace with 1-10’x4’ RCBC</td>
</tr>
<tr>
<td>9</td>
<td>Camino Portillo 3-8’x4’RCBC and 4-10’x3’ RCBC</td>
<td>High</td>
<td>Replace with 8-10’x6’ RCBC, Lower Channel invert 1”-2”, install grade control structures</td>
</tr>
</tbody>
</table>
In a letter from the District to the Town Engineer for the Town of Sahuarita dated April 29, 2014, the District made the Town aware of the drainage issues highlighted by the report and recommended that the Town perform necessary maintenance to resolve the issues. The Town stated that they did perform maintenance as a result of the letter, but the District does not currently have any details about that maintenance. An oblique aerial photograph on 5/21/2020 appears to show that the box culverts are partially blocked. It does appear that the culverts were more open in 2016 than in 2020, but it is difficult to compare the two due to image quality and photo angles. The image quality of the 2014 oblique photo is insufficient to draw any conclusions from.

18 A May 2020 oblique aerial photograph that appears to show that the box culverts that convey flows in Green Valley Drainageway #1 under Abrego Drive are partially obstructed with sediment.
The condition of the drainageway/channel upstream and downstream of box culverts is even less clear, as the oblique photographs aren’t useful in determining the sediment level of the channel.

**Post Flood Response**

The District and Pima County Department of Transportation coordinated to provide roll-off dumpsters for the residents of Madera Canyon Townhomes to aid in the disposal of water damaged property. The HOA rented a backhoe to clean the streets.

The Town of Sahuarita cleaned sediment out of the drop inlet structure for the box culverts. The Town did not have adequate equipment to clean the box culverts out in a timely fashion. Out of concern that additional rain in the area would cause a second round of flooded homes, and despite not having any maintenance responsibility for the culverts or the drainageway, the District used a JOC contractor (KE&G) to clean out the box culverts and the downstream channel. The channel maintenance was performed because cleaning out the culverts wouldn’t be an effective solution to prevent future flooding, the District also used the contractor to remove vegetation and sediment from the channel downstream of the box culverts in order to provide positive drainage from the invert of the box culverts. With three of the cells completely cleaned and the fourth cell 85% cleaned, another storm filled all of the cells with an additional 16” of sediment. As of August 19, 2021, all four cells are completely clear. The Town of Sahuarita hauled away the material removed by the District contractor.

The District had multiple conversations with the HOA presidents of both Madera Canyon Townhomes and La Joya Verde III. These conversations involved coordinating assistance (Madera Canyon Townhomes) and providing information to help them understand what happened and how to limit the impact of future flood events on their neighborhood.

19 District contractor KE&G cleaning out the culverts under Abrego Drive.
20 District contractor clearing vegetation in the channel downstream of the box culverts under Abrego Drive ahead of sediment removal operations.

21 Nearing completion of sediment removal from Drainageway #1 downstream of Abrego Drive. Photo taken 8/19/2021.