Coordination and Decision Support for International Outfall Interceptor Breach in Nogales Wash

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- Weather forecast offices staffed 24/7
- 260 miles of International Boundary with Mexico
- Several rivers flow north from Mexico
Nogales Wash Watershed

• Begins in Mexico and flows north into Arizona
• Sonora population much larger than Arizona
• Tributary of Santa Cruz River
• Annual mean flow 7 cfs/2.1 ft
Nogales Wash

- Concrete lined channel ~2 miles
- Constructed in 1930s by International Boundary and Water Commission (IBWC)
- Concrete has been damaged and lost thickness
Nogales Wash Flooding
• 2ft stage to over 9ft within 15-30 minutes

<table>
<thead>
<tr>
<th>Date</th>
<th>Gage Height (ft)</th>
<th>Streamflow (cfs)</th>
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<tbody>
<tr>
<td>29-Jul-2010</td>
<td>11.2</td>
<td>6410</td>
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<td>9-Sep-2011</td>
<td>7.76</td>
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<td>15-Aug-2012</td>
<td>9.45</td>
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<td>6-Jul-2013</td>
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<td>25-Jul-2014</td>
<td>9.8</td>
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<td>20-Aug-2015</td>
<td>10.25</td>
<td>5410</td>
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<td>3-Aug-2016</td>
<td>10.35</td>
<td>5510</td>
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<tr>
<td>10-Aug-2017</td>
<td>10.42</td>
<td>5580</td>
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</table>
International Outfall Interceptor

- Conveys wastewater from Nogales, Sonora & AZ to the Nogales International Wastewater Treatment Plant
- Portions lie underneath Nogales Wash
- Owned by the City of Nogales
- International Boundary and Water Commission operates & maintains treatment plant
Monsoon Season

• June 15 – September 30
• 50% annual rain falls during the Monsoon
• Thunderstorms with heavy rainfall and flash flooding

Photo by Marco Guevara
Gages

- 1 USGS stream gage on Nogales Wash
- 9 ALERT gages in Arizona and Sonora
IOI Breach

• July 25, 2017 City of Nogales Public Works reported a partial breach of IOI
• City notified IBWC of a dislodged manhole
• July 26 & 27 City of Nogales, Santa Cruz County, and State of Arizona Declarations of Emergency
• July 26 NWS notified of breach and request for weather briefings
• July 27 Arizona Governor requests assistance from Army Corps of Engineers
Agencies Involved in IOI Breach

- Arizona Department of Emergency and Military Affairs
- US Army Corps of Engineers
- City of Nogales, Arizona
- Arizona Department of Environmental Quality
- National Weather Service Tucson
- Pima County
Rainfall & Runoff prior to IOI Breach

- July 2017 rainfall well above normal of 4”
- July 17 & 20 widespread rainfall
USGS Coordination

- 2 USGS Stream Gages
- Increased data feed for Nogales Wash and Santa Cruz River at Tubac, AZ
- 5 minute readings
Additional sites identified that were impacted by high flows and flooding.
Nogales IOI Incident

Photos from USACE
Los Angeles District
NWS Support

- Daily Weather Briefings to WebEOC July 26 – Aug 29
- AZ DEMA coordination calls July 27 to August 15
- USACE coordination calls August 1-19
NWS Support

• 24/7 weather monitoring
• Severe thunderstorm & flash flood warnings
• Flood Advisories

BULLETIN - EAS ACTIVATION REQUESTED
Flash Flood Warning
National Weather Service Tucson AZ
109 PM MST SAT JUL 29 2017

The National Weather Service in Tucson has issued a

* Flash Flood Warning for...
  South central Santa Cruz County in southeastern Arizona...

* Until 415 PM MST

* At 108 PM MST, Doppler radar indicated thunderstorms producing heavy rain across Nogales Sonora where one inch of rain has fallen in 15 minutes. Flash flooding is expected to begin shortly in Nogales Arizona.

* Some locations that will experience flooding include...
  Nogales, Rio Rico Southeast and Rio Rico Southwest.

Severe Weather Statement
National Weather Service Tucson AZ
319 PM MST WED AUG 9 2017

AZC023-092230-
/O.CON.KTWC.SV.W.0066.000000T0000Z-170809T2230Z/
Santa Cruz-
319 PM MST WED AUG 9 2017

...A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT UNTIL 330 PM MST FOR SOUTH CENTRAL SANTA CRUZ COUNTY...

At 316 PM MST, a severe thunderstorm was located 8 miles southwest of Rio Rico Southwest, or just west of Nogales, moving west at 10 mph. Strong winds, small hail and very heavy, flooding rains have been reported with this storm.
NWS Support

- Heads up on storms that could impact Nogales Wash via WebEOC & phone calls

This small storm (#1) over the far southern part of Nogales Sonora has mostly dissipated and produced a little bit of rain over the southern part of the city. This might produce a foot or so rise in the wash in a couple of hours.

More concern is to watch storm #2 further to the south and we are watching.

County - Pima PLN Tech Specialist (ESF 5) - carl.cerniglia@noaa.gov at 14:35:16 on 07/31/2017

Runoff will result in elevated flows in the Nogales wash through at least 2 am MST Monday.
Challenges to repair IOI

Numerous high flows
IOI Breach Temporary Fix

International Boundary and Water Commission
United States Section

For immediate release
August 2, 2017

SEWAGE LEAK IN NOGALES HAS BEEN CONTAINED

Images from IBWC
IOI Breach Fixed

International Boundary and Water Commission
United States Section

For immediate release
October 6, 2017

CONSTRUCTION TO BEGIN OCTOBER 9 ON SEWER MANHOLE 89 IN RIO RICO, ARIZONA

Photos from Ray Sayre

International Boundary and Water Commission
United States Section

For immediate release
October 31, 2017

CONSTRUCTION COMPLETE ON SEWER MANHOLE 89 IN RIO RICO, ARIZONA

Photos from Ray Sayre
Conclusion

- Close monitoring of weather conditions was critical for repair work
- Coordination with USGS improved access to stream gage data
- Better understanding of rainfall thresholds in Sonora that trigger high flows in Arizona
- Local Weather Forecast Offices available 24/7 to support public agencies during weather impacting events

Photos from USACE Los Angeles District