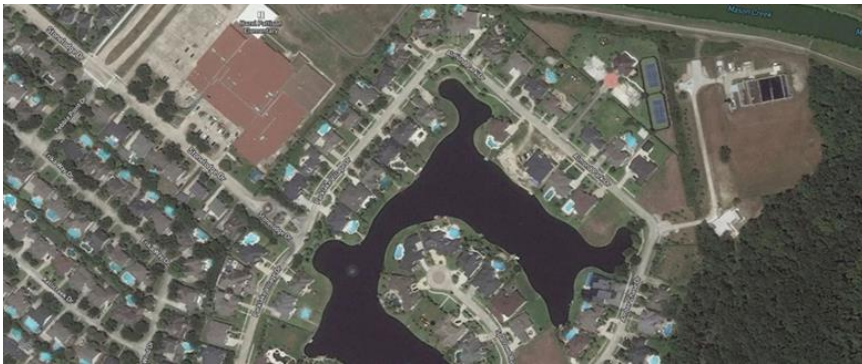


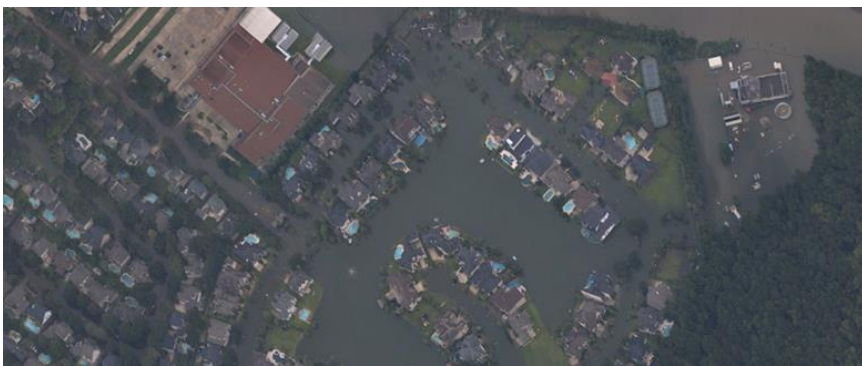
# Hurricane Harvey 2017

## *Houston Health Department Response Report*

August-November 2017



West Houston before Hurricane Harvey



West Houston after Hurricane Harvey

Photos by the National Ocean Service National Oceanic and Atmospheric Administration (NOAA)

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# HHD Hurricane Harvey Report

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## SECTION 1

### Incident Overview

On August 25, Hurricane Harvey made landfall on the central Texas coast as a Category 4 hurricane with winds of 130 miles per hour. The storm caused devastating damage to the Rockport and Corpus Christi areas, and then moved inland. However, instead of continuing inland as most hurricanes do, with a gradual loss of strength and destruction, Harvey stalled over south and southeast Texas for days, slowly meandering along the coastal area. The winds decreased and Harvey became a tropical storm, but the rains increased. The storm caused heavy rainfall and flash flooding, especially over the eastern portions of the area, including Houston.

The torrential rainfall led to catastrophic flooding with rivers and bayous overflowing their banks. Some areas were deluged with over 40 inches of rain in 48 hours. In Houston/Harris County, 9 out of the 19 official river gauges recorded all-time high flood stages. Total rainfall of 36-48 inches was recorded across much of the Houston area, with a peak at Bunker Hill Village in west Houston of 54.00 inches in the period from August 24 to September 1, 2017.<sup>1,2</sup> The National Hurricane Center reported the highest total measured rainfall from Hurricane Harvey as 60.58 inches near Nederland, Texas, close to the Louisiana border. Radar estimates were even higher, showing some areas in southeast Texas had likely received 65-70 inches of rain. These rainfall totals broke records for rainfall from a tropical cyclone across the continental U.S. from the time that reliable rainfall records began around the 1880s.<sup>2</sup>

Houston was in a dire position during the days following Harvey's landfall. The storm affected Houston from August 26-30. During much of that time Houston was on the "dirty" side of the storm, where most of the rainfall occurs. For days, the circular pattern of the storm would sweep out over the Gulf waters, pick up moisture, circle back over Houston, and drop that moisture in sheets of rain. Tropical storm level winds were not strong enough to cause as much damage in Houston as prior hurricanes, and most Houston residents had electrical power throughout the storm. However, the winds were strong enough to push surge waters from the ocean toward the city, slowing drainage of the massive amounts of rain into the Gulf and causing worse flooding. Commercial cargo ships and cruise ships were stuck at sea waiting for the storm to pass before they could enter the ports in Galveston and Houston.

### ***Overall Storm Report, including Texas and Louisiana***

On August 31, as the storm receded, the Houston Chronicle published the following numbers from Acting Homeland Security (DHS) Secretary Elaine Duke:

- 232 shelters housing around 32,000 people in shelters.
- 3 mega centers, two in Houston and one in Dallas.
- 21,000 federal workers are being mobilized, including those already in Texas.
- 14,000 National Guard mobilized.

- Of DHS employees: 3,500 FEMA workers are in Texas; 700 Coast Guard and 550 Customs Border Patrol officers are mobilized.
- The US Coast Guard is handling overflow of 911 calls in Houston.
- Estimates of calls coming in were as high as 900 per hour but now around 500 per hour. Seeing uptick in calls from Beaumont, Port Arthur and Orange.
- Major disaster declaration in 30 Texas counties and 5 Louisiana parishes.
- Texans affected by mandatory evacuation: 779,000.
- Texans affected by voluntary evacuations: 980,000.
- In Louisiana: 7,000 mandatory, 133,000 voluntary evacuees.
- Coast Guard reports they saved 3,000 lives.
- Estimated 200,000 customers in Texas and 11,000 customers in Louisiana without power. Customer means anything with a meter-- not a human.
- 120,000 residents without water in Beaumont

The following map from the National Weather Service (Figure 1) shows inches of rainfall reported during Hurricane Harvey as of August 30, 2017.

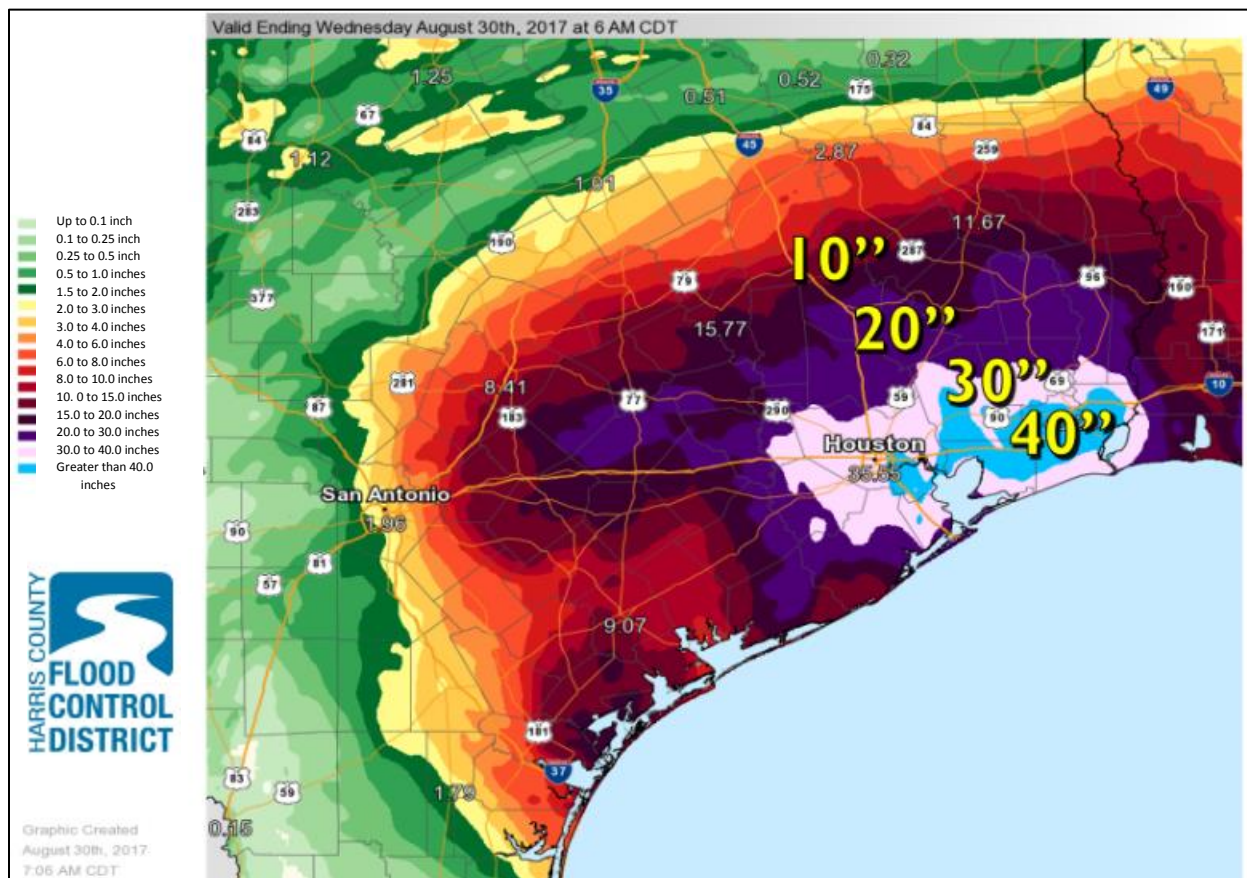


Figure 1. Map from the National Weather Service West Gulf River Forecast Center at <https://www.weather.gov/wgrfc>. An interactive map of the Harris County Flood Control District. 5 Day Rainfall Total based on rivers and baysous (courtesy of the West Gulf River Forecast Center).

## ***Houston Hurricane Harvey Storm Report***

- 20 trillion gallons of water fell on Houston.
- Highest rainfall reported in Houston was 54.00 inches at Bunker Hill Village.
- About a third of Houston/Harris County was underwater at the peak of the storm.
- The storm caused an estimated \$125 billion in damages, with some estimates as high as \$190 billion.
- 88 deaths were attributed to Harvey, with 50+ in the Houston area. Deaths directly caused by the storm totaled 68, with 36 of those in Harris County.
- An estimated 136,000 homes and structures were flooded in Harris County.
- 311,859 housing units were estimated to have been affected by the storm:
  - 148,413 single family units
  - 163,446 multi-family units
- 270 shelters were opened by the Red Cross and others, including the GRB Convention Center.
- 37,000 persons were evacuated to the shelters; the maximum was 12,000 at the GRB.
- Over 3,000 rescues took place according to the Houston Police Department, with many by the Cajun Navy (volunteers with boats) not accounted for.
- 256,845 volunteer hours were logged on reportourhours.com.
- The storm was so severe in the Houston area, it was considered to have a “less than 1 in 1000 years” chance of occurring in any given year by NOAA.

## ***City of Houston and the Houston Health Department***

As the hurricane approached, Mayor Turner was on the news, advising residents to be ready, but did not yet see a need for residents to evacuate. The Houston Health Department (HHD) began preparation three days before Hurricane Harvey made landfall. A key step was to activate two Incident Command Systems (ICS). The first ICS assigned staff to oversee operations at the George R. Brown Convention Center (GRB) mass shelter, and the second ICS was created to manage the overall Harvey response. HHD staff members set up communications and supply networks prior to the storm, and assigned 24-hour staffing to the City of Houston Office of Emergency Management.

The City of Houston Departments were anticipating flooding, but could not have predicted the extent of damage to the Houston area and the numbers of persons who were displaced from their homes. Many areas that had never flooded and were outside the identified flood plain were inundated with several feet of water. Some neighborhoods were flooded for the third time in three years. First responders transported thousands of evacuees to interim and mass shelters, despite road closings due to flooding.

As heavy rains fell and flooding inundated the Houston area, HHD took multiple roles to assist residents and evacuees, such as overseeing operations at the GRB until the Red Cross could arrive; opening its Multi-Service Centers to serve as “comfort stations” where people could find shelter and supplies before

going to a mass shelter; ensuring healthy conditions by inspecting the shelters and food establishments open during the storm; providing tetanus and other vaccinations; screening evacuees to determine medical, housing, food, and social service needs and referring them to resources; tracking possible infectious diseases; arranging transportation; and more.

The HHD response continued through October, as the department continued to conduct surveillance for communicable diseases and monitor safety at remaining shelter sites; and assist evacuees and residents to apply for assistance with FEMA, find resources, and begin to recover from the storm.

## SECTION 2

### Incident Timeline

Tuesday, August 22, 2017 – Hurricane Harvey landfall was predicted for the Texas Gulf Coast. The Houston Health Department (HHD) activated their Incident Command System (ICS) in preparation for the storm. Teams began planning for opening shelters and other rescue operations.



Hurricane Harvey approaches the Texas coast.  
Photo by NASA (U.S. National Aeronautics and Space  
Administration) [www.nasa.gov](http://www.nasa.gov)

Thursday, August 24 – Hurricane Harvey hit Port Aransas and Port O'Connor near Corpus Christi with 130 mph wind and left 250,000 people without power. The category 4 storm was more than 200 miles across and impacted much of the Texas Gulf Coast, including Houston. Houston Mayor Sylvester Turner declared a Local State of Disaster and requested that the Governor of Texas declare a state of emergency.



Friday, August 25 – The hurricane stalled over southeast Texas and was downgraded to a tropical storm. The center of the storm began moving toward Houston. HHD Incident Command tracked the storm’s progress and the likelihood of catastrophic flooding in the Houston area. HHD emergency response staff were placed on standby, with plans to open shelters if needed.

Saturday, August 26 – Heavy bands of rain and tornados began impacting Houston. The National Weather Service issued the first of many flash flood warning and emergencies for southeast Texas, including Houston/Harris County. Some Houston areas received 8-10 inches of rain in a few hours. Emergency shelters began opening across the city for those who were forced to leave their homes.

Sunday, August 27 – The rain continued, with 20-24 inches in some areas during the prior night. Houston area bayous were swollen and triggered catastrophic flooding across the city, especially in eastern Houston. Some areas had 29 inches of rain in two days. Both major airports were shut down, stranding hundreds of passengers. Flash flood watches were issued and expected to be in place until Thursday. Six people were reported to have died. Mayor Turner reported on Sunday evening that police and fire teams received nearly 6,000 calls and rescued more than 1,000 people, many trapped on their roofs or in their attics. HHD was in communication with the area Unified Command and Red Cross, and responded to their requests to open the HHD Multi-Service Centers as comfort sites. Emergency shelters were opened and were filling. HHD Multi-Service sites housed over 300 evacuees and 16 dogs. More than 350 people arrived at the Greenspoint area's M.O. Campbell Educational Center shelter between 10 p.m. Saturday and midday Sunday, according to Red Cross. Multiple roads were closed and littered with stalled vehicles; Houston TranStar listed 292 high-water locations on local roads.

The George R. Brown Convention Center (GRB) was opened as the central shelter for local residents, and outlying shelters began transferring evacuees there as roads would allow. HHD activated its shelter medical services at the GRB and surveyed HHD staff to determine who would be able to come to staff the shelter sites. Many HHD employees were in flooded areas. Evacuation rally points (comfort stations) were open at HHD Multi-Service Centers at Fifth Ward, Third Ward, Sunnyside, and Denver Harbor and West End; over 300 evacuees were at these HHD sites.

Monday, August 28 – The U.S. Army Corps of Engineers began controlled water releases from Addicks and Barker Reservoirs into Buffalo Bayou to prevent damage from the reservoirs overflowing. Homes on the edges of the reservoirs had already begun to flood, and additional homes and businesses in the reservoir release area were impacted by high water. The Office of Emergency Management reported open shelters in the Houston area: M.O. Campbell Education Center, J. Frank Dobie High School, and the George R. Brown (GRB). HHD Multi-Service Centers continued to serve as evacuation points and provide supplies. HHD ensured that TB patients had self-medication through Thursday. The HHD Epidemiology Division identified 26 shelters in the Houston/Harris County area and began reaching out to all of them for shelter surveillance to ensure safe and healthy conditions. HHD placed staff members at shelter sites as possible to guide and assist shelter staff.

- 26 shelters open



- Dobie HS shelter had 850 adults and 150 children
- The GRB had 9,000 evacuees
- M.O. Campbell and the GRB sites were accepting pets as well as people. Friends for Life, a local no-kill animal shelter, led efforts to check in and care for the hundreds of animals brought to the GRB with their owners. City of Houston BARC employees worked at both sites to check in and oversee animals.



Sleeping cots at the GRB.

Tuesday, August 29 – 14 fatalities were confirmed from flooding in the Houston area, including six family members who died while in their van trying to escape the rising water.

- 10,000 evacuees were housed at the George R. Brown Convention Center
- The City of Houston decided to open the Toyota Center as an additional shelter.

HHD provided landing sites for Coast Guard helicopters and kept Multi-Service Centers open for evacuees at Sunnyside, Fifth Ward, Denver Harbor and Acres Homes. HHD Epidemiology had conducted on-site surveillance at two shelters: the GRB and Forge for Families. Harvey began moving to the east toward Louisiana, after deluging some Houston areas with more than 50 inches of rain. Barker and Addicks reservoirs continued to rise. Residents near the reservoirs were asked to leave their homes. Flooding was occurring upstream from the reservoirs as well as in the surrounding area. Houston Police instituted a curfew for midnight to 5:00 am.



Supplies and the sleeping area at the St. Maximilian Kolbe Catholic Church shelter in northwest Harris County. The church shelter housed and fed over 300 evacuees at the height of the flooding. Church officials had trained with the Red Cross to learn how to set up a shelter so were prepared when Harvey struck. The church shelter was one of dozens run by volunteers during and after the storm.

Wednesday, August 30 – The rain subsided. Sixty-two shelters were open in the Houston area, with 12,700 evacuees in the shelters. Flood water releases from the Addicks and Barker dams caused Buffalo Bayou to rise even further, flooding thousands of Harris County homes. Cypress Creek on the west side was still high and flooding neighboring areas. Most other bayous and streams had already crested and were beginning to subside. Hobby and Bush airports began limited flights in the afternoon. Most schools and colleges were closed until September 5. Sections of I-10, Beltway 8, and Highway 6 on the west side of Houston were still flooded and closed. Also underwater: parts of US 59 and I-45, and the 610 eastbound frontage road near Wayside. HHD Multi-Service Centers received many donated items which were transferred to shelter sites. The HHD Jail Team and Pharmacy provided medical services at the HPD Southeast Jail at Mykawa. FEMA began instructing homeowners about how to file claims. Fifty-five evacuees were counted at HHD Multi-Service Centers. The HHD Immunizations team was working with the Texas Department of State Health Services to request 1,000 doses of Tdap (tetanus, diphtheria, pertussis).



Local stores began to re-open by August 30, but many shelves were bare. Some grocery stores limited how many people could come inside, restricted the amount of food they could buy (such as only 1-2 loaves of bread), and stationed local police officers in the stores to prevent looting.

Thursday, August 31 – The National Hurricane Service Issued its last advisory regarding Harvey this morning. Harvey was downgraded to a tropical depression.

Flooding rains continued across far eastern Texas and western Louisiana. Weather in Houston was sunny. Buffalo Bayou, Cypress Creek and the San Jacinto River remained at the flood level. Most other bayous and watersheds were falling below flooding range. Regular trash pickup resumed for Houston. Mandatory evacuation notices were issued to residents downstream from the Barker and Addicks reservoirs due to flooding caused by water releases. Deliveries to Houston stores had not fully resumed, so shortages of supplies existed at grocery stores and gas stations.

Friday, September 1 – Harvey was now a post-tropical cyclone and had moved on to the Tennessee-Kentucky area. Cypress Creek was expected to recede within its banks by September 3. Buffalo Bayou was still impacted by the Addicks and Barker Reservoir releases, which was expected to continue for 10-15 days. Mayor Turner requested voluntary evacuations for residents living south of I-10, west of Gessner, north of Briar Forest, and east of the reservoirs in homes currently flooded. The Army Corps of Engineers planned to release reservoir water that would impact these areas for up to 15 days.

There were 42 open shelters in the Houston area, with a population of 10,000. The primary shelters sponsored by the Red Cross were:

- NRG Center (1 NRG Park)
- George R. Brown Convention Center (1001 Avenida de las Americas)
- M.O. Campbell Center (1865 Aldine Bender Road)
- Golden Acres Baptist Church (2813 Pansy Street)
- Forge for Families (3435 Dixie)
- Pasadena High School (206 South Shaver, Pasadena)

The GRB population was down to 1,700. HHD added WIC (Women, Infant and Children Nutrition Program) and HIV/STD teams on site at the GRB. The WIC program also opened in three Walmart sites and was working to open most other sites by Tuesday. WIC sites saw approximately 400 low-income clients in need of food assistance. HHD had located all TB cases and suspects, and was monitoring their conditions. The HHD Environmental teams have inspected 148 food establishments and 20 shelters. The Epidemiology teams were monitoring a scabies outbreak at the GRB; both onsite pharmacies at the GRB were out of permethrin to treat scabies. HHD Incident Command determined that HHD would not conduct community assessments at this time, but would respond to complaints and issues as they arise. HHD Multi-Service Centers had 45 residents. The Houston Health Department HIV/STD//Viral Hepatitis Division set up a team to be at the GRB, to collaborate with the medical team, and a small team to be out in the field. The HHD Immunizations team was on site at the GRB. Three health educators, one nurse and three additional medical staff were also at the GRB.

Saturday, September 2 – Parts of Harris County remained under a flood warning until further notice. There were 36 shelters in operation with an estimated population of 5,511. The GRB was housing 1,411. Those in the voluntary evacuation area near the reservoirs were warned that they should not stay in their homes if the homes are flooded; they will not have electrical power for the next 10-15 days. The City of Houston drinking water remained safe, but several waste treatment plants were flooded and

people in those impacted areas were asked to conserve water use. HHD continued to help staff the GRB, coordinate donations, and provide transportation vouchers, immunizations and STD services. Evacuees were requesting food, diapers, formulas, gift and gas cards, bus cards, cleaning supplies, etc. Walgreens began holding immunizations clinics for First Responders at the NRG arena and the GRB shelter; over 120 First Responders were seen on the first day. The HHD Environmental Lab began receiving well water samples for testing. The HHD Lab resumed operations to test specimens for potential disease outbreaks. The HHD WIC team served 776 clients.

Sunday, September 3 – The storm had passed, but rain waters throughout eastern Texas continued to drain through rivers and bayous flowing through Houston to the Gulf. River flooding warnings remained in effect. Over 200 roadways in Texas were flooded. Several major freeways in the Houston area were closed due to high water. The voluntary evacuation for people in homes flooded downstream from the reservoirs was changed to a mandatory evacuation. HHD’s WIC program served 2,073 clients in need of food vouchers and other supplies.

Monday, September 4 – Houston Transtar reported 44 high water locations in Houston. The Harris County Toll Road Authority announced that all tolls will be free until further notice. Most METRO bus services and HOV lanes were scheduled to be open tomorrow. There were 38 shelters with 6,871 people and 1,067 at the GRB. Some of those still in shelters were in more complicated situations, such as being homeless prior to the storm. An estimated 1.4 million children will start school late; 6 of 10 children are economically disadvantaged. HHD Environmental teams continued to inspect food establishments and monitor air quality.

Tuesday, September 5 – 34 shelters were open with a population of 6,721; the GRB housed 1,611. Harris County health officials were setting up locations where residents who rely on well water could bring samples to be tested. The curfew was lifted for most of the city, except where flooding was still present. CenterPoint Energy had restored electricity to 99% of homes in the area. However, 3,408 homes were in flooded areas and were inaccessible to CenterPoint crews. Homes with flood water inside were going to have the electricity turned off. From August 26 to September 5, a total of 31 deaths in Harris County were attributed to Harvey. Many local groups were working to help residents. Businesses provided day camps for children and free child care while schools were closed, organizations worked to reunite lost animals with their owners, and restaurants donated food to shelters, as a few examples. HHD staff at the shelters were helping the remaining evacuees with follow-up case management and discharge plans.

Wednesday, September 6 – High water remained on several major roads and freeways in the Houston area. Downtown flooding closed the underground parking garage, the Criminal Justice Center, and the Wortham and Alley theaters. Repairs were expected to take 6-12 months. The HHD Laboratory received 134 well water samples between August 26 and September 5 for testing. HHD partnered with Target Hunger to do emergency food distribution at the HHD Multi-Service Centers. HHD Health Centers and Multi-Service Centers operations were back to normal. Transtar reported 51 high water locations.

Thursday, September 7 – The west Beltway 8 remained closed south of I-10 with traffic rerouted to Westheimer, due to flooding from the controlled releases of the Addicks and Barker reservoirs. This and other flooded locations caused severe traffic back-ups. Transtar reported 46 high water locations.

- 21 open shelters, housing 5,983 evacuees
- 1,667 at the GRB, 3 transferred for dialysis

HISD planned to start school on September 11. CenterPoint Energy reported 4,430 customers were impacted by flooding. The Houston Chronicle reported 119,317 homes damaged in Harris County, with 102,346 affected. Public property damages were estimated at \$389 million.

HHD Multi-Service Centers distributed uniforms for HISD students and food from the Houston Food Bank; and assisted residents to apply for housing assistance, D-SNAP (Disaster Supplemental Nutrition Assistance Program), and other resources.

Friday, September 8 – Buffalo Bayou continued to cause flooding in the release areas. The Downtown Municipal Courthouse was closed due to flood damage until further notice. Jury service was cancelled.

- 21 shelters were open with 4,774 evacuees
- GRB was housing 1,563
- 18 high water locations were reported by Transtar

Sunday, September 10 – The City of Houston coordinated with the State of Texas and FEMA to manage the recovery process. East Houston Regional Hospital was closed and LBJ Hospital had reduced services due to flood damage. HHD returned to normal operations for most services.

Monday, September 11 – HHD resumed normal operations, but still supported the GRB shelter and ongoing epidemiological and environmental surveillance. All 16 Houston area school districts had resumed classes. FEMA had opened three new disaster recovery centers in addition to the one at the GRB. The Texas Department of State Health Services was providing aerial spraying for mosquito control.

- 6 shelters reported 30 residents and were transferring evacuees to the GRB
- GRB was housing 1,276
- 10 high water locations reported by Transtar

Tuesday, September 12 – CenterPoint reported 1,314 customers without power. Since August 27, 2017, the City of Houston has recorded 16 deaths due to the storm, with 33 storm mortalities in Harris County. An estimated 30,000 to 40,000 houses were destroyed by Harvey floodwaters.

- 7 high water locations reported by Transtar

Wednesday, September 13 –

- 5 smaller shelters reported 29 residents and the remaining shelters continued to transfer evacuees to the GRB



- GRB housed 1,102
- 5 high water locations reported by Transtar

Thursday, September 14 – CenterPoint reported 904 customers without power. Roads near and downstream from the Addicks and Barker reservoirs remained closed. Mosquito spraying was in progress by Harris County Public Health and Environmental Services in coordination with the Texas Department of State Health Services and the U.S. Air Force Reserve. The U.S. Department of Health and Human Services launched the Disaster Supplemental Nutrition Assistance Program to serve Houston/Harris County, and local officials assisted in determining sites for the program. FEMA and the State of Texas had opened six Disaster Recovery Centers in the Houston area.

Friday, September 15 – Highway 6 remained closed between 1-10 and Clay, and Clay and Eldridge were impassable due to high water. These roadways were expected to be flooded for weeks as water releases from the reservoirs continued. The curfew was ended for all of Houston. All wastewater treatment plants were now fully operational.

- The GRB was planned to close this week
- 5 high water locations reported by Transtar

Tuesday, September 19 – All river gauges had fallen below flood level in the county. Nearly all bus routes were now functional. Highway 6, Clay and Eldridge continued to have flooded sections. Harvey caused spills from one of Houston’s dirtiest Superfund toxic waste sites into Vince Bayou and the city’s ship channel, and these spills had finally stopped, according to ABC news. HHD was transitioning to working on recovery needs, functioning under a new ICS Recovery Team structure. HHD provided the meeting venue and participated in the Texas Gulf Coast Regional VOAD (Volunteer Organizations Active in Disasters) meeting to coordinate recovery activities among multiple agencies. The 20 agencies represented were assisting residents with mucking and gutting their homes. Significant volunteer resources were being coordinated.

- GRB shelter was closed
- Evacuees were at two new shelters:  
HCC Shelter at 9494 Fannin, Houston (461 evacuees)  
Chinese Community Center at 9800 Town Park, Houston (155 evacuees)
- The HHD Care Coordination Team was working with 58 priority cases at the shelters

Tuesday, September 26 – Harris County had removed 500,000 cubic yards of storm debris. The goal was to pick up all debris within four months. Classes were resumed at seven highly damaged HISD schools on September 25 at new locations. The pre-Harvey flood map missed 75 percent of flood damages.

- GRB and NRG shelters had been closed
- 1 high water location reported by Transtar

Many organizations stepped forward to assist the relief efforts. See Section 10 for lists of some of the organizations that contributed to helping Hurricane Harvey evacuees and others affected by the storm.

Thursday, October 5 – The HHD Incident Command activated the Rapid Assessment Team to conduct a site visit at the Crofton Place Apartments in response to a request from the Mayor’s Office. The team met with management and residents to assess the health status of the buildings and advise them on health conditions and resources.

Wednesday, October 11 – FEMA provided a map of counties in southeast Texas declared areas of major disaster and eligible for assistance (Figure 2). The initial disaster declaration was on August 25, 2017.

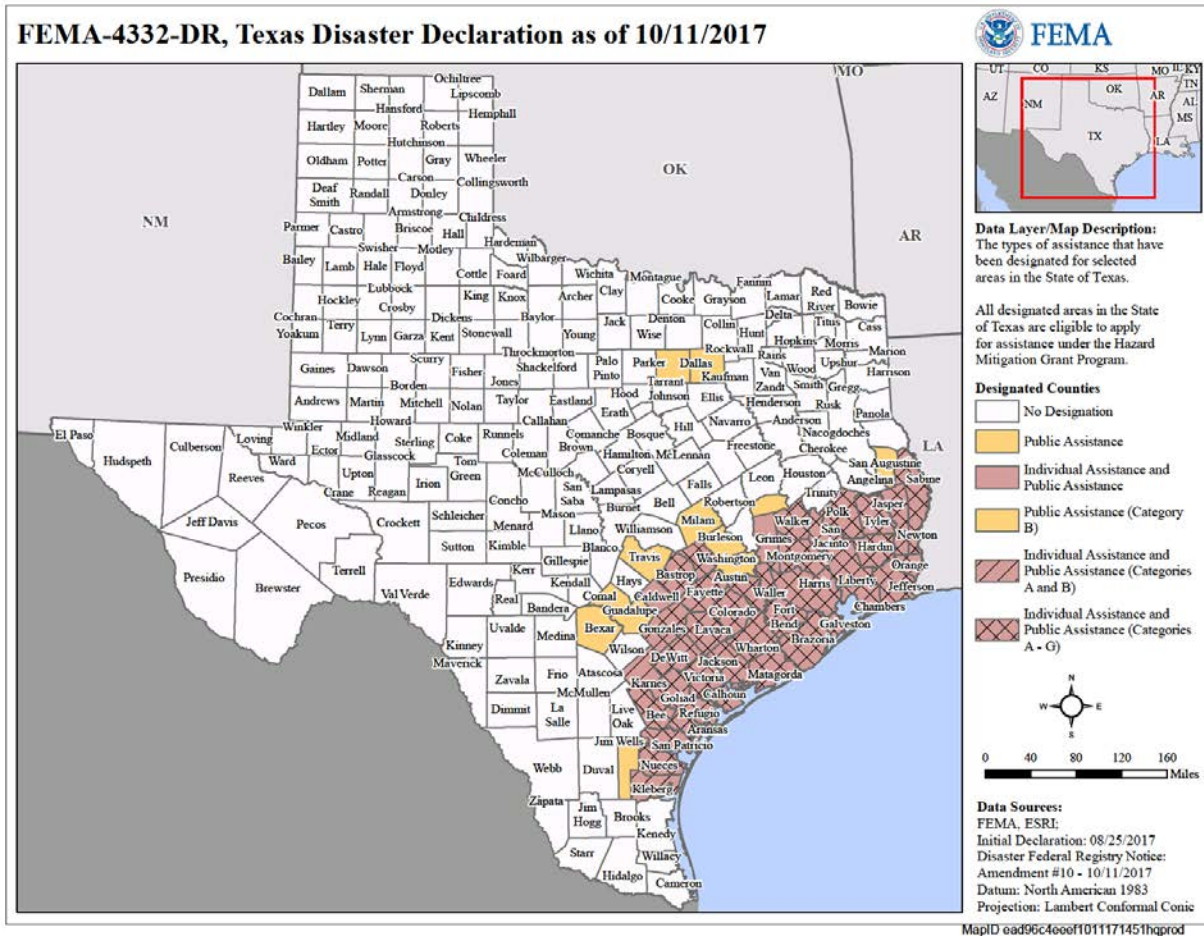


Figure 2. FEMA report: Texas Hurricane Harvey (DR-4332)  
Areas designated as major disaster. Available at <https://www.fema.gov/disaster/4332>

Friday, October 13 – The HHD Community Response Team was working with remaining shelters to identify medically fragile evacuees to ensure they were transferred to appropriate housing and case management. The team canvassed heavily affected areas to identify and refer residents to case management, especially older adults and individuals with disabilities/special needs.

Wednesday, October 25 – The Epidemiology team at HHD completed shelter surveillance monitoring for potential infectious diseases related to the storm and flooding.



Wednesday, November 15 – HHD opened the first Neighborhood Restoration Center (NRC) at Kashmere Multi-Service Center. The NRC was set up to provide multiple resources for flood victims, with representatives from more than 16 disaster recovery partner agencies. Kashmere was the first of 12 NRCs to be opened across Houston by HHD and partners BakerRipley and Memorial Assistance Ministries.



Flooding in low-lying areas remained for days after Hurricane Harvey had passed. Some homes were flooded and streets were impassable in the Addicks and Barker Reservoir areas for three weeks.

## SECTION 3

### Initial Disaster Response

#### *Pre-Hurricane Actions*

The Houston Health Department (HHD) began disaster response activities three days before Hurricane Harvey was predicted to make landfall on the Texas Gulf Coast. The department:

- Activated two stand-by Incident Command System (ICS) structures with assigned HHD staff— one for the George R. Brown Shelter response and the second for the overall Harvey response. HHD staff members were ready to respond as soon as flooding and road conditions allowed.

- Assigned HHD employees to the City of Houston Office of Emergency Management (EOC) for 24 hour duty.
- Prepared to open remote resource sites known, as comfort stations, at several HHD Multi-Service Centers to provide supplies and serve as an interim place for evacuees waiting for transfer to the mass shelters.
- Established communication, coordination, and resource-sharing agreements with EOC and other City of Houston departments.
- Provided remote virtual assistance for city-wide preparations.



HHD staff at the Emergency Operations Center (OEM)

### ***The Incident Command System (ICS)***

HHD activated two Incident Command Systems to monitor flood conditions and manage the HHD response at the GRB shelter and the HHD overall response across Houston. ICS is a national incident management tool with an organizational structure designed to manage large incidents. ICS is used in many types of disaster responses across the US, such as large forest fires and coastal rescues. HHD employees are trained in the use of ICS, and have used this model for past large-scale disasters, such as hurricane response, and for major community projects such as outreach to help residents sign up for health insurance through the Affordable Care Act. ICS works well to manage large-scale projects, especially those with many partners who may not be used to working together. ICS organizes the response under one Incident Commander with functional areas for Planning, Logistics, Operations, and Finance. Each person in the disaster response is assigned an ICS role and an ICS supervisor. Their ICS role

is generally different than the role they have in their home organization. The ICS chart for the GRB Shelter is shown in Figure 3.

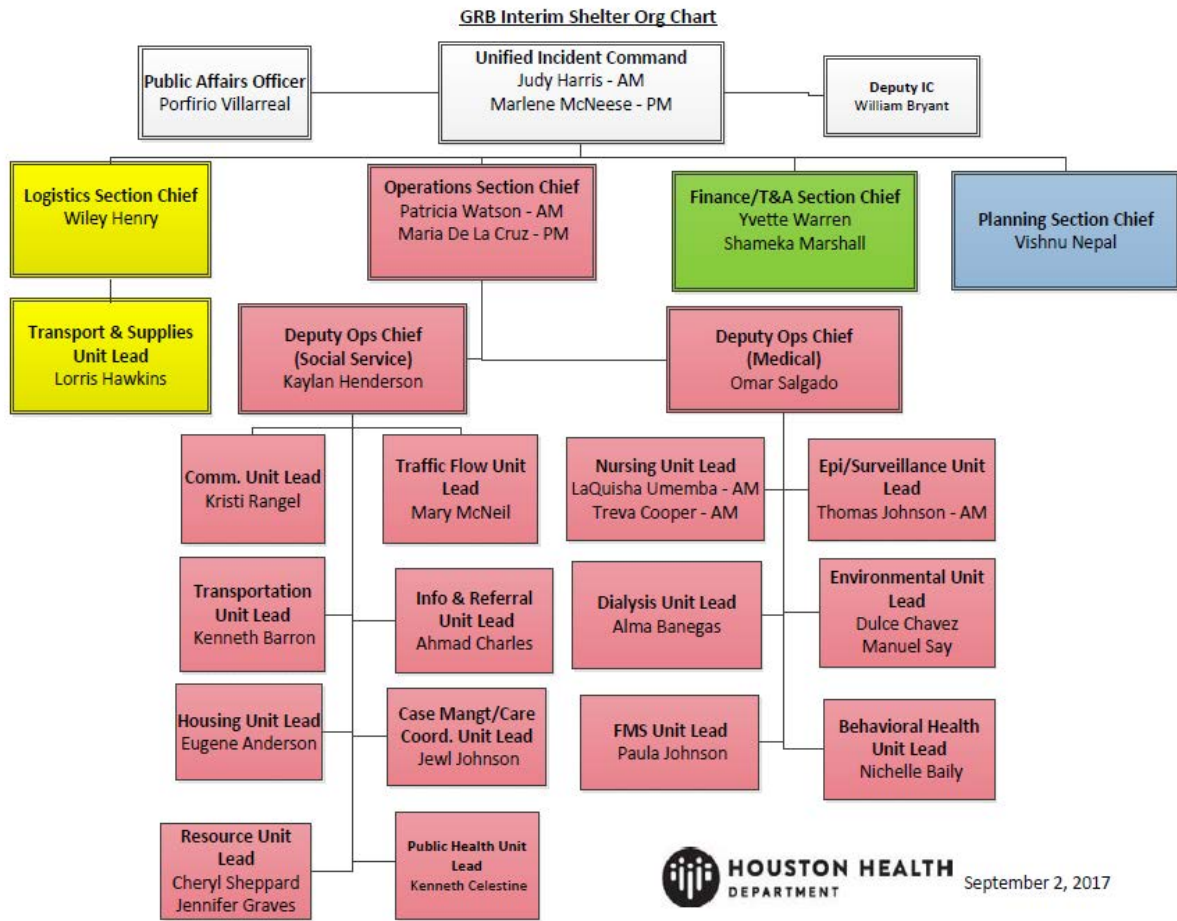


Figure 3. GRB Interim Shelter ICS Organizational Chart

**Post-Hurricane Actions**

HHD staff members have been training in use of the ICS to manage disasters for over 10 years, and have used the system to quickly organize and manage a variety of activities and events. HHD has a Bureau that focuses on disaster preparation in the Division of Surveillance and Public Health Preparedness. This Bureau leads the department in disaster readiness through year-round trainings and exercises, and takes a key role in events such as hurricanes. This preparation for disaster was essential to the department’s coordinated rapid response to the storm.

HHD immediate post-hurricane actions during the first seven days included:

- Moved from the pre-hurricane ICS to activate the full Incident Command System and coordinated staff for the HHD Multi-Service Center comfort stations.

- Activated 30% of the HHD staff to work on the hurricane response, over 400 employees. Of these, 110 were assigned to shelter operations.
- Worked closely with the City of Houston Office of Emergency Management's Emergency Operations Center (EOC) to provide public health input and coordinate the disaster response.
- Activated "comfort stations" at the HHD Multi-Service Centers to provide water, food, shelter, baby formula, diapers and blankets.
- Transported Incident Command staff to the George R. Brown (GRB) Shelter for staff members who lived in flooded areas or were unable to reach the shelter.
- Developed infrastructure and support for set-up and operations at the GRB until the Red Cross arrived.
- Coordinated services at the GRB with the Houston Department of Housing and Community Development.
- Provided 24-hour staffing at the GRB to assess and monitor evacuees and refer them to resources.
- Identified, assessed and coordinated social service resources to meet evacuee needs.
- Provided behavioral health staff to address immediate evacuee mental health needs, especially in the first 72 hours before other local and federal resources could arrive.
- Conducted FEMA screening of evacuees.
- Provided immunizations.
- Arranged transportation for evacuees to leave the shelter.
- Established additional WIC locations.
- Screened for those needing housing assistance, medical services (vision, podiatry, mental health services), food stamps, and hotel assistance for 3,000 evacuees.
- Coordinated transportation from the Multi-Service Centers to the GRB Shelter.
- Provided staff and evacuees with guidance and recommendations from the Office of Emergency Management.
- Coordinated with State of Texas staff to request supplies such as wheelchairs, services from DMAT (Texas Disaster Medical Assistance Team), disaster behavioral health assets, and TDAP (tetanus, diphtheria, and pertussis) vaccines.
- Provided 24-hour epidemiology support for the DMAT teams.
- Conducted shelter surveillance to assess for any infectious conditions or diseases.
- Conducted environmental inspections of the GRB, three or more times each day, to ensure sanitary conditions.

HHD took key roles in the storm response at the City of Houston Emergency Operations Center (EOC). The EOC serves as the central hub of disaster response, with representation from City Departments and local partners. At the EOC, the HHD team: (1) served as the Public Health Liaison representative, to provide input about public health status and concerns, and make requests to the State for resources, (2) participated on the EOC Incident Management System (ICS) team that led and coordinated the city-wide disaster response, and (3) coordinated the EOC Planning Cell. The Planning Cell group tried to anticipate



needs, such as when shelters should be opened, what supplies would be needed at the shelters or for other operations, and when to make requests for resources.



HHD staff person assisting an evacuee at the GRB.

## SECTION 4

### Shelters and Evacuee Needs<sup>3</sup>

Houston has a history of heavy rains that have led to thousands of evacuees who had to abandon their homes due to high water. Large mass shelters at the Astrodome and the George R. Brown Convention Center (GRB) housed thousands following Hurricane Katrina in 2005 and the GRB served as a shelter for Hurricane Ike evacuees in 2008. Many smaller shelters across the city provided refuge for other evacuees. HHD Multi-Service Centers were set up as comfort stations where people could stay for a few hours until transportation was arranged to take them to the GRB mass shelter. To prepare for Hurricane Harvey, HHD drew on experiences with these storms and other floods, and protocols developed to conduct health assessments, ensure health and safety at shelters, and connect residents with resources.

HHD operations mobilized to support the mass shelter set up and operations at the GRB for Hurricane Harvey evacuees, and ensure safe conditions and medical care at the GRB and other smaller shelters.

The department:

- Activated the internal Incident Command structure.
- Deployed 30% of the HHD workforce.
- Worked closely with police and fire first responders and the Red Cross to set up the shelter.
- Collaborated with the federal Disaster Medical Assistance Teams (DMAT), the US Public Health Service Federal Medical Service Station team (FMS), the Houston Department of Housing and Community Services, and the American Red Cross to provide care and support for evacuees.
- Conducted intakes and initial assessments of evacuees.
- Coordinated with multiple agencies to provide services for evacuees.
- Conducted FEMA screenings and enrollment.

- Provided immunizations.
- Coordinated and arranged transportation.
- Provided medical oversight through the HHD Chief Medical Officer.
- Screened evacuees for housing assistance, vision and podiatry needs.
- Provided counselors for immediate mental health issues.
- Arranged medication refills for evacuees with local pharmacies.
- Coordinated and arranged transportation for patients in need of urgent dialysis.
- Assisted with living/skilled nursing facility placement.
- Conducted shelter surveillance and environmental monitoring to ensure sanitary conditions.
- Provided epidemiological support to the Disaster Medical Assistance Team (DMAT).
- Made specific requests for resources and coordinated with the state and federal agencies through the City of Houston Office of Emergency Management (OEM).

HHD assigned approximately 110 employees to shelter operations. The team operated at full capacity for the first 13 days, from August 27 to September 9. After that, HHD operated at 20% capacity (about 22 employees) for the eight days from September 9 to September 16.



HHD service desk at the GRB Shelter

The Epidemiology, Environmental Health, and Human Services Divisions of HHD also moved into action. These teams worked to ensure that:

- Basic public health medical services, such as immunizations for evacuees and first responders were provided as needed.
- Food services were handled safely at the mass shelters and temporary interim shelters.

- Any infectious diseases were identified and treatment and/or isolation was provided as needed.
- Evacuees were assessed and assisted to find resources and enroll for services such as food stamps.
- Residences were inspected for dangerous conditions such as mold in the walls or floors.
- Screenings for evacuees included needs for housing assistance, and vision and podiatry needs.
- Immediate counseling for mental health needs and referrals for continuing care were provided.
- Medication refills were arranged as needed.
- Transportation for evacuees needing dialysis was arranged.
- Assistance was provided for evacuees to be placed in living/skilled nursing placements, if needed.
- Shelter counts were conducted, in cooperation with local universities.
- Flood damaged food establishments were inspected.
- Multifamily housing units were inspected to ensure habitability.
- Residents were helped to remediate mold growth. The inspectors also collected
- Samples of flood water and soil samples were collected for lab analysis.

HHD also made specific requests for resources from state and federal agencies through the City of Houston Office of Emergency Management.



Staff, volunteers and evacuees sort through donated clothing at the GRB shelter.

## SECTION 5

### Medical and Nursing Needs in a Mass Shelter After Hurricane Harvey<sup>4</sup>

The Houston Health Department responded to Hurricane Harvey by swiftly preparing to receive evacuees and by taking the lead to set up the first mass shelter at the George R. Brown Convention



Center (GRB), until additional resources arrived, almost 72 hours later. HHD also opened several of its Multi-Service Centers as temporary sites for evacuees waiting for transportation to the mass shelter at the GRB or to stay with family/friends.

The population at the GRB grew quickly. The Red Cross provided cots and blankets at the GRB, which housed more than 12,000 people at one time, more than two times its initial capacity.

Evacuees were very stressed. They were dealing the trauma of losing their homes and belongings, and many went through harrowing experiences to get through the flood waters and to the shelter. Their medical and nursing needs were most intense during the first 10 days of operations at the GRB mass shelter. The medical team examined over 3,300 evacuees, some with complex health needs. HHD and partners provided care for the evacuees until the arrival of doctors and nurses on the Disaster Medical Assistance Team (DMAT). The DMAT is a part of the National Disaster Medical System under the U.S. Department of Health and Human Services.

HHD took key roles during the first 10 days of operations at the GRB. The HHD teams assessed evacuees, treated infections, managed chronic health conditions, conducted environmental health and safety inspections, coordinated medical care, connected evacuees to services, and supported the DMAT team. Some highlights include:

1. HHD, the Houston Fire Department and local emergency medicine teaching hospitals set up and operated a medical station for the first 72 hours of GRB mass shelter operations, until the arrival of the DMAT team and other FEMA assets.
2. HHD medical and nursing team initiated infection control precautionary standards for communicable disease prevention at the outset at GRB. They provided the treatment of dermatological infections, wound care and coordinated the provision of assistive devices such as wheelchairs, walkers and canes. The nursing team provided diabetes and nutrition education, counseling, testing and treatment supplies for diabetics.
3. HHD assisted the FEMA Disaster Medical Assistance Team (DMAT) and American Red Cross to assess, triage, and treat shelter evacuees with medical needs and concerns.
4. The medical and nursing team at GRB (DMAT and Red Cross) assessed 3,304 evacuees during the 16 day period from August 29 to September 13, 2017. Of these, 2,539 cases were classified as non-urgent, 212 were urgent cases and the rest were dismissed. A total of 139 individuals were found symptomatic. The three most common complaints were coughing (N=47), diarrhea (N=36) and vomiting (N=21). The Health Department developed and implemented a standard multi-tiered medical fragility and needs assessment process to determine the level of need and provide services at that level.
5. HHD epidemiologists conducted shelter surveillance at the GRB and other smaller local shelters for 16 days from August 29 to September 13, 2017, to monitor infectious diseases and set up isolation areas for infection control.
6. HHD Environmental Health Inspectors evaluated showers and provided information to the American Red Cross on infection control and prevention, promoted American Disability

Association (ADA) recommendations for building access for those with disabilities, and recommended sanitation measures in the hall that housed pets.

7. The Health Department coordinated transportation for evacuees with hemodialysis, behavioral health emergencies, and chemotherapy needs. HHD also provided transportation vouchers and coordinated appointments to help evacuees access medical care with their own physicians, if available.
8. Temporary interim shelters were set up across the Houston area, in places of worship, schools and community centers. The locations of these temporary shelters were somewhat unpredictable and changed frequently. Despite these challenges, HHD called or inspected 88 temporary interim shelters for potential hazards related to infectious diseases and poor environmental conditions, and spoke with residents at the shelters. The most common complaint of evacuees at the interim community shelters were headaches and body aches.



Evacuees registering for assistance and researching resources at the GRB.

## SECTION 6

### Houston Health Department Teams

#### Public Health Preparedness

The HHD Bureau of Public Health Preparedness (PHP) works year-round to ensure that HHD staff members, community partners, and Houston residents are prepared to respond to disaster situations. PHP convenes subject matter experts (SMEs) in preparedness to build and revise response plans, and coordinates training and exercises so that HHD employees are disaster ready. PHP also provides community trainings and information for partners and residents through a variety of outreach activities.

When disasters like Hurricane Harvey strike, PHP takes key response support roles. During and after Hurricane Harvey, PHP staff served as Public Health liaisons in the Houston Emergency Operations Center (EOC), collaborated with HHD Leadership, and represented the Health Department on the Incident Management Group. PHP submitted requests to the state for resources such as oxygen, wheel chairs and vaccines, through the State of Texas Asset/Assistance Request (STAR) system.

PHP also coordinated with the EOC Planning Cell to track the overall city response and anticipate future challenges and needs. As an example, PHP worked with the Planning Cell team to plan ahead for the shelters, to quickly identify shelter sites and assess the sites for flooding, determine necessary resources, and initiate resource requests.

#### Epidemiology

HHD Epidemiologists conducted surveillance to track infectious diseases and deaths at local hospitals and shelters. The teams set up isolation areas where needed to prevent the spread of disease. Epidemiologists also partnered with local universities to conduct shelter counts and assessments; UT School of Public Health students completed 4,156 shelter evacuee assessments or “cot surveys.”<sup>5</sup> See the Appendix for the forms used to conduct surveillance in the shelters.

HHD assigned 25 epidemiologists and Surveillance Investigators to the hurricane response, and the team worked with two additional epidemiologists from the Texas Department of State Health Services (DSHS) Region 1 to provide a variety of shelter surveillance activities from August 28, when shelters first opened, through October 27, 2017, when the final Red Cross shelter at Greenspoint was closed. The team was on site to conduct 24/7 surveillance at the GRB and Toyota Center, provided epidemiologists to assist the Harris County Public Health Epidemiology Team at the county’s NRG shelter, and coordinated services with epidemiologists from the Texas Department of State Health Services.

Key Epidemiology activities were:

- On-site surveillance for large shelters (census greater than 150).
- Daily phone or in person visits to community shelters (census less than 150).
- Daily visits to large shelters after the GRB and NRG mass shelters were closed. These sites included Forge for Families, Dobie High School, and three Red Cross shelters at Greenspoint, HCC Fannin, and Shell. Some sites had up to three visits per day if public health concerns were identified.
- Daily calls to pop-up shelters in the community, identified through the shelter board on WebEOC and by monitoring local media. In person visits were also conducted at least once for each shelter. Additional in person visits were scheduled when surveillance staff were not able to make phone contact with a listed shelter for two days. Over 70 reported pop-up shelter sites were assessed.

The Epidemiology Team also assisted the overall Harvey response by serving as a transportation resource. The team:

- Transported donated supplies such as pallets of water, bleach, food, toiletries, clothing, blankets, cleaning supplies, wheelchairs, walkers and baby diapers/wipes from donation sites to distribution centers including the GRB, Salvation Army, Commerce and Crockett warehouses, and Multi-Service Centers.
- Assisted in setting up the GRB shelter by transporting cots, office supplies, and other materials.
- Helped move belongings for individuals when they left the shelters, and determined if the water had receded enough for transportation trips to be made.

## **TB Control**

The HHD Bureau of TB Control has standing protocols for major storms and other emergency situations. When Hurricane Harvey approached, the TB program activated these protocols for (1) providing patients with medications to take on their own, and (2) providing contact information so patients who are displaced can reach the TB team. The TB Control Team at HHD worked closely with the Texas Department of State Health Services to closely monitor patients during and after the storm. The TB teams use Directly Observed Therapy (DOT) to ensure that patients take each medication dose. Since this was difficult during much of the storm, the Bureau relied more on video-enabled devices, such as smart phones, for staff to observe patients taking medication. Medication programs were also adjusted to account for any doses patients missed during the storm.

A total of 282 TB cases state-wide, and 212 in the local area, were considered high priority TB cases: those with new TB diagnoses, infectious patients, and children. All but two of the 282 persons were accounted for within a week after the storm began. The remaining two were located the following week and connected to care. Of the 282 cases:

- 61 were on video-enabled DOT
- 30 had TB disease
- 31 had latent TB infection and needed DOT

- 59 were monitored and did not miss any doses
- Although respiratory illnesses were reported among evacuees in the shelters, no suspected cases of undiagnosed TB disease were reported.<sup>6</sup>

## **Environmental Health**

### *Consumer Health Services*

After Hurricane Harvey, the HHD Bureau of Consumer Health Services worked to prevent disease from food borne and water borne illness. The team worked closely with the Epidemiology Team for surveillance activity to ensure safe and healthy conditions at shelters across Houston. The Consumer Health team conducted surveillance 24/7 of shelter activity for the first two weeks following the storm. This included reviewing disinfectant procedures for showers, restrooms, and food preparation areas; and general environmental conditions and food handling procedures in the shelters.

The Consumer Health team performed over 2000 disaster surveillance inspections at food establishments following the storm. These inspections led to multiple closures of establishments due to storm and flood damage, and unsafe conditions. Consumer Health condemned tens of thousands of pounds of food due to contact with flood water and failure of cooling equipment. Please see the Appendix for Consumer Health guidelines for food establishments following disasters.

### *Pollution Control and Prevention*

The HHD Bureau of Pollution Control and Prevention (BPCP) is responsible for improving the quality of ambient air, water and land in Houston. They do this by responding to complaints, conducting surveillance and investigations, providing permitting and rule-making comments, enforcing laws, monitoring the environment and doing community outreach. Following Hurricane Harvey, BPCP was most concerned with danger to Houston residents from air and water pollution.

Immediately after Harvey's landfall in Houston, BPCP management, chemists, engineers and Environmental Investigators monitored explosions and emissions from controlled explosions at Arkema, a chemical plant near Houston, to ensure the safety of Houston residents. The plant lost power due to flooding which led to chemicals stored at unsafe temperatures. BPCP chemists deployed the MAAML (Mobile Air Ambient Laboratory) in Kingwood (downwind of Arkema), in Mason Park, and in the Valero Houston Refining community to test ambient air quality after Harvey. BPCP engineers worked with Valero to assess the damage from their emissions event and determine how soon repairs and cleanup could be completed.

BPCP engineers surveyed large storage tanks on the Holmes Road area and conducted odor surveys and surveillance using the PID (Photoionization detector) for Volatile Organic Compounds monitoring and the Infrared Camera for visible emissions. The Environmental Division was also active in helping

Manchester residents identify the source of gasoline odors. The team found high levels of benzene in the air, a volatile organic compound that is a known carcinogenic. They were able to trace the source to spills from a failed floating tank roof that had been sunk by the heavy rain, and the source of the spill was quickly removed. Fortunately, the air contamination did not reach the level that would have required evacuation of the community.<sup>7</sup>

Equipment and analyzers at all ambient air monitoring sites were shut down prior to Harvey's landfall to prevent damage. The equipment was undamaged, but trailers that housed equipment did have water damage. Repairs were made and within two weeks all air quality monitoring was generating valid data normally.

During the period of August 25 through October 12, the Bureau of Pollution Control and Prevention (BPCP) responded to over 700 Service Requests / Citizen Complaints through the City of Houston 311 call line. These included:

- Total outdoor air pollution cases: 138 created and investigated
- Total water and ground pollution cases: 14 created and investigated
- Total indoor air quality cases: 596 created and investigated



BPCP Environmental Investigator collecting water samples to test for total coliform count. Coliform is a type of bacteria found in human intestines that can contaminate food and water. The samples were taken to the HHD Environmental Laboratory for testing.

The BPCP Clean Rivers Program Section collected approximately 95 bacteria (E-Coli) surface water or swab water samples after the hurricane landfall, between September 5 and October 5, 2017. Sampling was conducted in partnership with the University of Houston Central, U. of H. Downtown and Rice University; and site visits were also made with New York Times representatives. The Clean Rivers team also gave interviews to the Wall Street Journal, New York Times, and several other publications regarding sampling efforts after Harvey.



The Clean Rivers team conducted investigations into 21 sites with potentially contaminated water, soil and sludge: in the downtown and west Houston areas, in flooded homes, near Superfund sites (sites known to be contaminated with hazardous waste) and chemical plant sites, and at locations with past high levels of E. coli bacteria. The team also trained University of Houston Downtown students to assist with water and sample collection efforts.



A BPCP Clean Rivers Team obtaining soil samples after the flooding to check for contaminants.

BPCP Environmental Investigators also provided information on air and surface water quality, and mold prevention and remediation at the Harvey Recovery Information Sessions sponsored by several Houston City Council members.

### **Human Services**

Human Services staff assisted the evacuees to navigate through many complex screening, eligibility and enrollment procedures. HHD served 3,268 evacuees in the 11 day period from August 31 to September 11, 2017. Services included:

- 288 persons received hotel assistance
- 335 came for services/needs for families with children such as food, clothing, baby formula and diapers through the Women and Children (WIC) program
- 663 were assisted with eyeglass replacements
- 2,870 received transportation (taxi and Metro) vouchers
- 20 were linked to services for HIV positive clients

The Harris County Area Agency on Aging worked to supply resources for seniors, including identifying state funding to help the recovery efforts for seniors, delivering 4,000 home meals each day, and determining seniors with needs related to the storm.



## **Multi-Service Centers**

HHD Multi-Service Centers (MSC) served as comfort stations for evacuees and local agencies such as law enforcement. The MSCs provided temporary shelter for those waiting to be transferred to the mass shelter, distributed food and other supplies, and assisted residents to apply for D-SNAP (Disaster Supplemental Nutrition Assistance). The MSCs served as donation centers, and forwarded donations to evacuee sites. In the three weeks during and after the hurricane, the MSCs assisted 4,778 persons with needs including temporary shelter, housing assistance, transportation, food or other services (not including D-SNAP).

D-SNAP was a common request, with thousands applying. In one day, the Southwest MSC assisted 1,232 persons with D-SNAP. (Note: The Texas Tribune reported that 634,400 persons were approved for D-SNAP supplemental food after Hurricane Harvey. To be eligible for D-SNAP, applicants must live in the 39 counties designated as Hurricane Harvey disaster areas and show that they have had financial expenses related to the storm, such as lost income or home damage, and didn't receive benefits from the federal Supplemental Nutrition Assistance Program (food stamps) before the storm. They also have to meet income eligibility requirements. D-SNAP provides up to \$649 for groceries for a four person household.)

## **WIC (Women, Infants and Children Nutrition Program)**

Houston Health Department WIC locations were functioning to serve low-income persons in need of food assistance on August 31, shortly after the storm passed, with expanded weekend hours to make the sites more available to evacuees and others impacted by Hurricane Harvey. WIC also set up sites at the GRB shelter and three Wal-Mart stores. Shortly after the storm, WIC sites were serving over 1,000 persons each day. By September 19, a total of 12,279 persons had received food assistance.

## **Immunizations**

The Houston Health Department Immunizations team began working with the Texas Department of State Health Services on August 28 to request additional doses of Tdap (tetanus, diphtheria and pertussis) vaccines for First Responders and evacuees. By September 1, the HHD teams were staffing the GRB and working with the GRB medical teams, and were coordinating with Walgreens and CVS to immunize First Responders with Tdap and Hepatitis B vaccines. Evacuees received Tdap, flu and pneumococcal vaccines.

The Immunizations team also partnered with the Care Van mobile (sponsored by Caring for Children Foundation of Texas) to provide additional vaccinations in the community. As the Hurricane Harvey response continued, HEB and Kroeger joined to provide Tdap and flu vaccine services in their operational pharmacies. The HHD Immunizations team also went into the community to provide Tdap

vaccines at a Calvary Health Fair in Acres Homes; and flu vaccinations at a Greenspoint shelter, and the Red Cross Headquarters in Katy, TX (for First Responders).

The HHD Immunizations Bureau activated an Incident Command structure for their staff members. Nursing staff worked 12-hour shifts in the medical areas. The VFC (Vaccines for Children) team was activated to contact physicians and other providers in the area, and check on the status of their practices. The team also assisted WIC with operations at Wal-Mart. Over the course of the storm response, up to October 25, HHD Immunizations ordered 3,000 additional vaccine doses for the Houston area and received 4,000 doses for delivery to Anahuac and Beaumont. The team provided some vaccinations directly and also worked with multiple physician offices, pharmacies in stores, and shelter medical teams to ensure that appropriate vaccinations were available and administered. Immunization sites for first responders and evacuees frequently administered from 40-110 vaccines each day.

## **Laboratory Services**

### *Environmental Laboratory*

The HHD Water and Dairy section of the Environmental Lab began receiving well water samples on September 2. By Tuesday, September 19, the lab had received and tested 1,382 samples of well water. Of these, 289 were found to be positive for total coliforms bacteria and 183 were positive for E. Coli. The lab also provided education for residents about how to disinfect and test their private wells.

### *Clinical Laboratory*

The Clinical Laboratory sections for Microbiology, Virology/Serology, Health Center Support, and Molecular Diagnostics began operations as soon as staff members were able to come to the work site.

The Lab tested specimens from PulseNet (samples from sick people seen at various hospitals or clinics to detect food borne illnesses), stool samples from the shelters to test for Norovirus and bacterial pathogens, respiratory specimens for flu testing, and samples for other potentially infectious diseases. The lab also worked with the HIV/STD teams to supply rapid HIV test kits and HIV/STD/Viral Hepatitis testing, monitor results from hospitals that could indicate infectious outbreaks, and test samples for the HHD Health Clinics.

## **HIV/STD/Viral Hepatitis**

The HIV/STD/VH team set up a disease intervention team at the GRB, co-located with the HHD Epidemiology/Surveillance at the GRB. The HIV/STD/VH team also placed a team out in the field to assist other shelters and evacuees. The team interviewed persons with potential infections, and provided testing, educational counseling and treatment.

By September 5, the HIV/STD/VH team had processed 246 lab tests and 446 electronic lab reports.

## **Public Information**

When an event occurs with significant public health risk, HHD helps to provide information for warnings and coordinate communication to the public about health risks. HHD works through the Public Information Officer or Joint Information Center. During and after Hurricane Harvey, the Houston Joint Information Center provided frequent information and guidance to local residents. The team helped to ensure that there was good representation of bilingual speakers at the GRB and some access to ASL interpreters for the hearing impaired. The team also worked to identify and dispel rumors, so that residents would have accurate information about how best to prepare and cope with the storm effects.

## **HHD Hurricane Harvey Community Response Team**

The HHD Community Response Team was created to assist the community several weeks after the storm passed. After the mass shelters closed, the team worked with remaining shelters to identify medically fragile evacuees to ensure they were transferred to appropriate housing, and coordinated with United Way's Long Term Recovery Committee's Case management Work Group, BakerRipley and the Salvation Army to provide case management and resources.

The Community Response Team worked with Texas Organizing Project to canvas heavily affected areas to identify vulnerable residents, especially older adults and individuals with disabilities or special needs, and refer them to case management. The team identified concerns, such as: 1) individuals being refused by FEMA because of discrepancies with social security information, 2) landlords not completing mold remediation on housing units, 3) people living in unsafe housing that had been flooded but without mold remediation, 4) homeowners who do not know what to do to repair their homes, 5) people with transportation needs, and 6) individuals who have lost their jobs. Team members and case managers then worked to assist residents to find resources and take action. The team also coordinated home cleaning and repairs with local organizations.

## **SECTION 7**

### **Neighborhood Restoration Centers<sup>8,9</sup>**

The City of Houston, working with Bloomberg Associates, New York, and numerous community partners launched the post-Hurricane Harvey Neighborhood Restoration Center (NRC) pilot project on November 15, 2017. This project was created to determine the social, economic and emotional needs of residents and small businesses impacted by Hurricane Harvey at the neighborhood level, and then address these needs using a "one-stop-shop" approach where residents could access services and resources.

The concept of a restoration center was borrowed from New York, where, in the aftermath of Hurricane Sandy, neighborhood centers were established to provide access to important information, resources and services to residents. NRCs are planned to be physically accessible to clients and serve as one-stop shops with many local service providers. The NRC works with their providers to coordinate services and reduce redundancies. A shared data system helps to ensure that the host organization and provider groups can operate efficiently and track residents for follow-up. NRCs are also seen as a way to build relationships between the providers and the community, and thus to strengthen long-term neighborhood resilience.

The HHD pilot center was housed at Kashmere Multi-Service Center (MSC), which is one of the 11 community centers operated by the Houston Health Department (HHD). This location was selected due to extensive physical damage in the area due to flooding, and because the area has many low-income and minority group residents with limited resources. The NRC was opened on Wednesdays from 9:00 am to 7:00pm, with a staff of 6-15 HHD team members, depending on the usage through the day. The HHD staff set up and ran the operation, while external organizations provided the services to the flood-affected residents.

All clients received an initial assessment, and then were provided with educational resources and routed to the appropriate services. Some immediate support such as food, water, clothing or baby formula, was provided at the NRC, while other resources involved counseling, education, applying for benefits, or case management. A follow-up call was made within seven days to ensure that the client had used the referrals and to answer any questions.

More than 16 disaster recovery partner agencies came together to provide services. Core partners were:

- BakerRipley
- Houston Area Urban League
- Memorial Assistance Ministries
- City of Houston (COH) Department of Neighborhoods, New Americans & Immigrant Communities
- COH Department of Neighborhoods, Mayor's Citizens' Assistance Office
- COH Houston Public Works – Houston Permitting Center
- COH Office of Business Opportunity
- COH Housing & Community Development Department
- COH Houston Health Department
- COH Houston Health Department – Area Agency on Aging
- COH Office of Emergency Management
- COH Solid Waste Management Department

Services included:

- Food and nutrition assistance

- Temporary housing information
- Health and medical benefits
- Business restoration
- Counseling services
- Financial assistance
- Personal records and information
- Legal assistance
- Emergency preparedness information
- Services for elderly
- Home foundation repairs
- Health insurance resources
- Other benefit programs

The pilot Kashmere NRC quickly geared up to assist evacuees; the NRC served between 38 and 168 clients each week during the first four weeks. Experiences at Kashmere were used to evaluate the effectiveness of this model and then to refine the model. Based on the success of the Kashmere NRC, HHD expanded its partnerships with BakerRipley and Memorial Assistance Ministries to offer long-term disaster recovery support and services in more neighborhoods hit hard by Harvey. HHD opened additional NRCs in HHD Multi-Service Centers at Acres Homes, West End, and North East. The initial partners also opened new NRC Centers.

NRC shelters were soon opened at 12 locations across the city. Each provided four main service areas: (1) Outreach, Engagement, and Assessment, (2) Disaster Recovery Information, (3) Workshops & Special Events and (4) Direct Services. The NRC locations were:

1. HHD Acres Homes Multi-Service Center
2. East Aldine Mobile Center (BakerRipley)
3. Edgebrook—served by a mobile bus in the Saint Frances Cabrini Catholic Church (BakerRipley)
4. Greenspoint—served via a mobile bus unit in the Teloloapan Meat Market (BakerRipley)
5. Gulfton BakerRipley
6. HarbachRipley Neighborhood Center (Golfcrest / Bellfort / Reveille, Greater Hobby Neighborhood) by BakerRipley
7. HHD Kashmere Multi-Service Center
8. Memorial Assistance Ministries Center
9. HHD Northeast Multi-Service Center
10. Memorial Assistance Ministries at Spring Branch Community Health Center
11. HHD West End Multi-Service Center
12. Cleveland-Ripley Neighborhood Center (BakerRipley)

## SECTION 8

### After Action Evaluation: Strengths and Recommendations

Part of the process in disaster response is the post-disaster rehash to assess the strengths, gaps, and lessons learned. Lessons learned from the Harvey response addressed issues identified internally, locally, regionally and state-wide.

#### ***Mass and Interim Shelter Needs<sup>3</sup>***

##### ***Strengths:***

1. The mass shelter at the GRB was opened quickly and safely housed and fed up to 12,000 evacuees, twice the number that had been anticipated.
2. HHD staff members who were able to reach the GRB and Multi-Service Centers responded in the midst of the storm and worked with first responders to organize the shelter and take in evacuees for the days before national resources could arrive. Staff members were flexible and cooperation was high.
3. The HHD Incident Command Systems worked well to organize staff and efforts.
4. A wide range of services were provided to a large number of people.

##### ***Recommendations:***

1. Improve city-wide coordination of services, especially in regard to collecting data to inform the disaster response.
  - Data collection and coordination could be improved. Data should be well tracked, and easily shared and used.
  - Data should include information such as numbers of evacuees, medical conditions, transportation needs, shelter sites, needed resources, and amounts and location of available resources.
  - Future disasters could benefit from improved advance planning that would coordinate reliable resources and have them in position so that they could be called upon when the event occurs. This could be done by partnering with other City Departments and community providers. Each partner would need to be prepared for a disaster, have sufficient capacity and be well versed with using technology to capture data.
  - Although a preliminary shared data structure was in place at GRB, shared survey tools and a more comprehensive shared data system would have led to better quality and timeliness in responding and providing services.

2. Local and state government agencies should maintain regular testing of a training plan using the NIMS Incident Command System (ICS) and promote establishing a unified command structure for a more coordinated response.

- Training in ICS should be expanded to include more local and state government agencies. This would help to improve coordination of the overall response, as responders would better understand their roles under the ICS structure, which may be very different from their usual work roles. This would also ensure that the crucial activities of a disaster response are met.

3. Several gaps were identified that need to be filled for future disaster responses.

- Provide better access to prescription medication.
- Improve access to dialysis facilities for diabetic evacuees.
- Ensure adequate behavioral health resources for evacuees in the shelter and others affected by the flood.

### ***Medical and Nursing Needs in a Mass Shelter<sup>4</sup>***

#### ***Strengths:***

1. Medical and nursing resources were mobilized quickly to assist evacuees.

2. The residents at the shelter were provided with immunizations and visits with a physician or other provider when needed. They were assisted to visit their personal doctors, and to access dialysis and other services in the community when these were available.

3. The medical, nursing, and paramedic staff members from HHD and multiple other local and national organizations integrated services well and provided a robust level of care.

4. The HHD Epidemiology and Consumer Health teams provided good disease and environmental monitoring and implemented control measures to reduce opportunities for disease transmission

#### ***Recommendations:***

1. Improve ICS activation and response.

- Test the department system that announces the ICS activation prior to an emergency response event to assure that all employees named in the ICS structure receive timely communication.
- Promote the adoption of city-wide use of the ICS structure to improve coordination of the city-wide response.

2. Ensure timely access and availability of medical personnel and other supplies.

- Ensure that Emergency Medical Services and the Houston Health Department have access to sufficient quantities of routine medical supplies such as insulin, anti-hypertensives and psychotropic medications. Additional medical supplies that are required to care for the evacuees need to be available, when needed.



- Behavioral health was identified as one of the primary needs of the shelter evacuees. Evacuees needed the help of more providers trained in mental health. Timely arrival of the mental health specialty DMAT team could help alleviate delays in access to mental health services.

3. Provide better access to pre-assigned resources for the evacuees.

- Ensure that potential comfort center locations have preassigned staff and supplies such as blankets, food, diapers, baby formula and clothing.
- Set up prior coordination and agreements with local pharmacies to have an onsite presence for prescription needs.
- Establish prior arrangements with dialysis centers to provide services at shelters.
- Clearly define roles, responsibilities and expectations of HHD, FEMA, and American Red Cross to help reduce duplications and redundancies.
- The Department should remain focused on the goals of shelter surveillance, care coordination, service linkage, and support for housing. These services help to stabilize evacuees and prepare them to return to the community so they do not need the shelter to remain open indefinitely.
- Other groups, such as the Texas Public Health Association could assist local, regional and state governments by promoting greater coordination between and within departments, in response to a large scale natural disaster.
- Information sharing among city departments, especially the Office of Emergency Management, Fire Department, Police, Public Health, and the Mayor’s Office needs to be more seamless. Houston has local Public Health Authority physicians, and could be an important resource for emergency response planning and implementation with the Police and Fire Departments.

The HHD experience indicates that responding to the initial medical and nursing needs of the evacuees in the mass shelter requires:

1. Extensive coordination, collaboration and communication between government officials and other health providers and also
2. Nimbleness, flexibility and timeliness of response.

***Environmental Services—Limiting Harvey-Related Carcinogenic Air Pollution Exposure<sup>7</sup>***

***Strengths:***

1. The HHD Environmental team used manual monitors and other measuring devices to maintain air pollution monitoring in the aftermath of Hurricane Harvey, when the area network was not available.
2. The HHD Environmental team identified and abated a toxic benzene leak in Manchester before a community evacuation might have been needed.
3. The Environmental team drew on strong relationships with local scientists and researchers to augment their sampling of air pollution.

4. The Houston 311 citizen complaint system reliably recorded and reported resident concerns about gasoline odors in Manchester.

5. The Environmental Teams and partner scientists were persistent, thorough, and determined to find the source of the toxic emissions.

***Recommendations:***

1. Persistence, double-checking, and verification of the initial gas odor event was crucial to discovery of the pollution emission. This act of double-checking should be held up to the staff to emphasize the importance of verification.

2. The community played a significant role by reporting gasoline odors to the 311 complaint line. This role of community reporting needs a continued emphasis, so that residents understand how the complaint process works and how they can protect their neighborhoods.

3. Community relationships with scientists and researchers are of key importance, and helped the Environmental Team optimize response time and limit toxic air pollution exposure. Building and maintaining these relationships should be a continuing emphasis for the HHD Environmental teams.

***Neighborhood Restoration Centers<sup>8</sup>***

***Strengths:***

1. The HHD pilot Neighborhood Restoration Center at Kashmere was created and staffed quickly, to serve as a pilot project. The Kashmere Center was opened on November 15, 2017, just six weeks after the storm.

2. The Kashmere project quickly enlisted multiple partners to assist in the effort. More than 16 disaster recovery partner agencies came together to provide services and information.

3. The neighborhood location and multiple services at one site helped many nearby residents to access resources quickly.

3. The success of the pilot project served as a basis for opening 12 locations across the city in areas with low-income residents and flood damage. HHD, BarkerRipley, and Memorial Assistance Ministries sponsored the sites. Some were housed in neighborhood centers and others were set up in mobile vans.

***Recommendations:***

1. Have all service providers available when the NRC is first opened and throughout its operation.
  - This helps to create trust between the neighborhood and the NRC, and ensures that early arrivals will have access to all services.

2. The NRC can serve to assist those with chronic needs, not all of which are related to the hurricane.
  - Underserved communities often have residents with multiple long-term needs and the NRC can serve as a channel to reach those with pre-existing needs and may be helpful for those residents who are hesitant in accessing other services in person, especially if they find out that the provider is a government body.
3. Conduct strategic marketing to contact hard to reach populations.
  - Marketing of the pilot project was through word of mouth, which did not reach some of the population in need.
4. The pilot project provided confirmation that other centers are effective in multiple ways and locations.
  - Centers can be opened in multiple low income communities.
  - Community partners are interested in sponsoring NRCs.
  - NRCs can help social service agencies reach underserved communities that were not impacted by Hurricane Harvey.
5. Improved coordination between case management agencies is needed.
  - Shared information and resources can increase efficiency and better ensure that clients receive the needed services.

## SECTION 9

### Six Month Update

On February 23, 2018, Mayor Turner gave a press conference to report on accomplishments and what still needs to be done following Hurricane Harvey.

Following Hurricane Harvey:

- 345,000 housing units were damaged in Houston.
- \$2.5 billion in damage from the storm.
- Houston collected \$100 million from its insurance policy.
- 8,897 applications for repairs were received.
- 12 neighborhood restoration centers were opened.
- Houston temporarily allowed Harvey victims to have RVs and mobile homes on their property during the time of repairs.
- The joint city-county Hurricane Harvey Relief Fund raised \$112 million from 125,000 donors, and has regularly dispersed assistance to the community.

- 3,422 families are still living in hotels, and many more are living in homes still in need of repair.
- \$424 million has come to Houston for direct home repair programs from FEMA. Thus far, no other federal repair dollars have been received.
- Houston still anticipates portions of the \$5 billion allocated from HUD, and the \$90 billion Congress has approved for disaster aid.
- Mayor Turner is launching a new volunteer program called Houston Still Needs You. The organization will coordinate volunteers with relief agencies. The mayor tweeted: Go to <http://houstontx.gov/volunteer> to join "Houston Still Needs You." Our goal is to get 2 million volunteer hours in the next year; the hours give us a credit from @FEMA for our financial share of the recovery! #HurricaneHarvey.

Shortly after the mayor's press conference, the City Council approved \$2 million for new firefighter flood rescue equipment and prepared to enact tougher building rules for new homes.

## SECTION 10

### References, Resources and Partners

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9. City of Houston, Houston Recovers website. *City of Houston Opens Neighborhood Restoration Centers in Affected Neighborhoods*. <https://houstonrecovers.org/neighborhood-restoration-center/>

### **Additional Information Resources**

#### **City of Houston**

*Houston Recovers*. City of Houston disaster recovery information. The *Harvey by the Numbers* section provides maps and data, including response, damage, debris removal and other resources.

[www.houstonrecovers.org](http://www.houstonrecovers.org)

#### **Episcopal Health Foundation**

*An Early Assessment of Hurricane Harvey's Impact on Vulnerable Texans in the Gulf Coast Region*. The report found that "Two-thirds (66%) of residents across 24 Texas counties report that they suffered property damage, employment disruptions and/or lost income due to Hurricane Harvey. Three months after Hurricane Harvey, nearly half of affected Texans say they are not getting the help they need to recover." December 2017.

<http://www.episcopalhealth.org/en/research/hurricane-harvey-recovery-resources/>

#### **FEMA**

*Hurricane Harvey Snapshot*. Summary of the disaster impact and the responses by FEMA, Red Cross, Department of Homeland Security, U.S. Coast Guard, the Centers for Disease Control, the Small Business Administration, and others. September 3, 2017.

<https://www.fema.gov/news-release/2017/09/03/hurricane-harvey-snapshot>

#### **Houston Chronicle**

The Chronicle ran daily reports through and after the storm, and provided updates for months after that. The archive editions of the Chronicle are available at <https://www.chron.com/>

## **Houston Health Department**

*Health+Recovery Guide.* The Houston Health Department's Guide to HHD services, recommended health measures, and other community resources.

[https://issuu.com/thetremag/docs/healthy\\_holiday\\_recovery\\_17102](https://issuu.com/thetremag/docs/healthy_holiday_recovery_17102)

*Houston Health Department: Harvey GRB Response.* A video overview of activities at the George R. Brown shelter and the department's work to support evacuees and other Houston residents impacted by the storm.

[https://www.youtube.com/watch?v=A3\\_UxWK1eQ8](https://www.youtube.com/watch?v=A3_UxWK1eQ8)

*Hurricane Harvey Relief Efforts--Supporting Immigrant Communities: Guide to Disaster Assistance Services for Immigrant Houstonians.* Resources for those, especially immigrants, affected by the storm.

<http://www.houstontx.gov/na/Harvey-Resource-Guide.pdf>

## **National Hurricane Center**

*2018 National Hurricane Center tropical cyclone report: Hurricane Harvey.* An overview of the storm, including storm warnings, storm surge, winds, rainfall, flooding and other impacts.

[https://www.nhc.noaa.gov/data/tcr/AL092017\\_Harvey.pdf](https://www.nhc.noaa.gov/data/tcr/AL092017_Harvey.pdf)

## **NPR (National Public Radio)**

*How 311 Helped Understand Air Pollution After Harvey.* December 10, 2017 article with transcripts and recordings of many calls about unusual chemical odors to the Houston 311 call center received during and after Hurricane Harvey.

<https://www.npr.org/2017/12/10/569716823/how-311-helped-understand-air-pollution-after-harvey>

## **The Washington Post**

*What the flooding and rescues of Hurricane Harvey look like, in videos.* More than 30 videos of Hurricane Harvey rescues, evacuations, property damage, firefighter response, and other scenes from Hurricane Harvey from August 27 through September 1, 2017.

[https://www.washingtonpost.com/graphics/2017/national/harvey-video/?utm\\_term=.4799c167d2c7](https://www.washingtonpost.com/graphics/2017/national/harvey-video/?utm_term=.4799c167d2c7)

*In Post-Harvey Houston, Immigrants Struggle As The City Grapples With How To Help.* December 10, 2017 article about Houston's diversity and how some immigrant families coped with the storm.

<https://www.npr.org/2017/12/10/569716760/immigrants-in-post-harvey-houston>

## **City of Houston Key Partners**

- Harris County
- Red Cross
- Coast Guard
- FEMA

### **Red Cross Shelters**

- George R. Brown Convention Center (1001 Avenida de las Americas)
- M.O. Campbell Center (1865 Aldine Bender Road)
- NRG Center (1 NRG Park)
- Toyota Center (1510 Polk Street)
- Golden Acres Baptist Church (2813 Pansy Street)
- Forge for Families (3435 Dixie)
- Frank Dobie High School (10220 Blackhawk Boulevard)
- Pasadena High School (206 South Shaver, Pasadena)
- Many additional small shelters had prior staff training with the Red Cross, and were able to open and run the shelters with minimal Red Cross assistance.

### **Agencies Providing Services at the HHD Shelters**

1. Target Hunger
2. YMCA Success by Six
3. El Centro de Corazon
4. La Raza United
5. Some Seniors
6. Community Choice
7. Gateway to Care
8. Prounitas
9. Harris Health
10. Gateway to Care

### **Neighborhood Restoration Centers**

1. HHD Acres Homes Multi-Service Center
2. East Aldine Mobile Center BakerRipley
3. Edgebrook (served by a mobile bus in the Saint Frances Cabrini Catholic Church) by BakerRipley
4. Greenspoint (Served via a mobile bus unit in the Teloloapan Meat Market) by BakerRipley
5. Gulfton BakerRipley
6. HarbachRipley Neighborhood Center (Golfcrest / Bellfort / Reveille, Greater Hobby Neighborhood) by BakerRipley
7. HHD Kashmere Multi-Service Center
8. Memorial Assistance Ministries Center
9. HHD Northeast Multi-Service Center
10. Memorial Assistance Ministries at Spring Branch Community Health Center
11. HHD West End Multi-Service Center
12. Cleveland-Ripley Neighborhood Center (BakerRipley)

## SECTION 11

### Appendix—Shelter Surveillance Reporting Forms, Part 1



## General Shelter Surveillance Situational Report

Incident Name: \_\_\_\_\_ Jurisdiction: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Date of Report (MM/DD/YYYY): \_\_\_\_\_ Total # of shelters in PHR: \_\_\_\_\_

Total # of individuals housed in shelters: \_\_\_\_\_ Total # of shelters reporting: \_\_\_\_\_

### Summary of Current Public Health Events

Complete the table below for any shelters reporting an increase in the total number of individuals with complaint of any symptoms/conditions or injuries listed in the *General Shelter Surveillance Summary Form*. Use the "COMMENTS" area to provide information on pending investigations and/or events of public health significance.

#### Type of Events (use acronyms in table):

Gastrointestinal Illness (**GI**), Respiratory Illness (without fever) (**RI**), Wound/Skin Infections (**WI**), Influenza-like Illness (**ILI**)\*, rashes (**RA**), other (specify)

\*ILI includes fever (greater than 100°F) or feverishness and a cough and/or a sore throat in the absence of a KNOWN cause other than influenza.

#### Status of Event (use acronyms in table):

Preliminary (**P**): new report, investigation pending

Active (**A**): currently investigating

Closed (**C**): investigation complete and interventions/recommendations provided

Ruled-out (**RO**): investigation complete and determined not of public health significance

Shelter Name	County	Type of Event	Status of Event	Number Affected	Shelter Census

**COMMENTS:**

**Prepared by:** \_\_\_\_\_ **Title:** \_\_\_\_\_

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## Shelter Surveillance Reporting Forms, Part 2



### General Shelter Surveillance Summary Form

Address for Local Health Dept: \_\_\_\_\_ Phone: \_\_\_\_\_

**Fax daily by \_\_\_\_\_ AM to: \_\_\_\_\_**

Reporting Person Name: \_\_\_\_\_ Title: \_\_\_\_\_

Shelter/Reporting Facility/Address: \_\_\_\_\_

Shelter Phone #: \_\_\_\_\_ Shelter Fax #: \_\_\_\_\_

For the last 24-hour reporting period: Time/Date: \_\_\_\_\_ to \_\_\_\_\_

How many people were here? \_\_\_\_\_ Count taken at \_\_\_\_\_ AM  PM

Of these, how many appear less than 7 years of age? \_\_\_\_\_

***This report represents a total number of \_\_\_\_\_ ill persons.***

<i>Symptoms/Condition Category</i>	Total # of individuals with complaint within the last 24 hrs
<b><i>Section 1: Infections and Disease Potential</i></b>	
Fever or feverishness	
Of those with fever, how many had diarrhea?	
Of those with fever, how many had vomiting?	
Of those with fever, how many had either a cough or sore throat or both?	
Of those with fever, how many had a rash?	
Of those with fever, how many had a severe headache or stiff neck or both?	
Diarrhea (without fever)	
Vomiting (without fever)	
Coughing, difficulty with breathing, sore throat (without fever) <i>Do not include chronic conditions or smoker's cough</i>	
Sores, boils, draining wounds, serious skin rash, blisters (without fever)	
Scabies, lice, or other infestation or ringworm or fungal infections	
Jaundice (yellowing of the skin or eyes)	
Conjunctivitis (pink eye)	
<b><i>Section 2: Injury/Other</i></b>	
Self-inflicted injury. <i>Please describe under comments section.</i>	
Assault related injury. <i>Please describe under comments section.</i>	
Accidents. <i>Please describe under comments section.</i>	
Heat-related injury or dehydration. <i>Please describe under comments section.</i>	

**Total # of individuals referred to a medical facility for any medical concerns within the past 24 hours?** \_\_\_\_\_

Have any deaths occurred in your shelter within the past 24 hours? Yes No

*If yes, number of deaths in past 24 hours?* \_\_\_\_\_

Have any physical fights occurred among teen or adults within the past 24 hrs? Yes No

*If yes, the number of people involved?* \_\_\_\_\_

**Additional public health comments or concerns** *(use additional pages if more space is needed):*

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Houston Health Department

### CONSUMER HEALTH SERVICES | GUIDANCE

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#### POST DISASTER GUIDELINES AND PROCEDURES

- Any food or produce other than food packaged in waterproof metal, glass or hard plastic containers that has come in contact with flood waters should be considered unfit for human consumption, denatured, and disposed of. If not disposed of immediately, food items determined to be unfit for human consumption must be segregated (separate room, building, or receptacle) from food items retained for sale or distribution.
- Food packaged in waterproof metal, glass, or hard plastic containers that has come in contact with flood waters should be considered distressed and may be sold as such if otherwise safe. These items may be sold as salvage to a salvage operator licensed by the Texas Department of State Health Services. These food items must be segregated from food items for sale or distribution.
- Food contact surfaces of equipment that have come in contact with flood waters must be thoroughly cleaned and sanitized before re-use. Disassembly of equipment may be required for cleaning and sanitization. Once initially sanitized non-food contact surfaces such as door and equipment handles should be cleaned and sanitized frequently thereafter.
- The Houston Health Department has been advised that the City of Houston Municipal water supply is safe for drinking and other uses.
- If you are unsure about a non-City of Houston water supply, you should consider boiling your tap water for at least 1 minute or use bottled water.
- Frozen food that has thawed because of power outages may be sold, distributed, or consumed as fresh food provided that the temperature has not exceeded 41°F for any period of time. After the temperature exceeds 41°F for more than 2 hours, the food is considered unfit for human consumption and must be denatured and disposed of.
- Refrigerated food that has exceeded 41°F for more than 2 hours is considered unfit for human consumption and should be denatured and disposed of.
- During a post disaster period, such as this employee hand washing is more important than ever. Employees handling food should be required to thoroughly wash their hands and exposed portions of their arms more often than normally required by the Houston Health Department

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*Created/Revised: August 28, 2017/August 29, 2017*

*Page 1 of 2*

## Consumer Health Services: Post Disaster Guidelines, Page 2

Houston Health Department



### CONSUMER HEALTH SERVICES | GUIDANCE

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- As a food establishment operator, it is your responsibility to properly secure, segregate and dispose of food pending disposal or transfer to a salvage operator. Additional dumpsters and security may be necessary and are the establishment operator's responsibility.
- Establishments without electrical power should not be operating. If temporarily closed by the Houston Health Department, establishments cannot reopen until re-inspected by the Department. If an establishment closes on its own, it can reopen upon restoration of power and any disposition of damaged or distressed food items and cleanup of the facility.

#### **Additional Information:**

- Post Disaster Food Protection Guidelines (more detailed information):
  - <http://www.houstontx.gov/health/Food/Post%20Disaster%20Food%20Protection%20Guidelines.pdf> (you may have to cut and paste this link)
- Products That Should be Destroyed and Cannot be Reconditioned or Salvaged (more detailed information):
  - <http://www.houstontx.gov/health/Food/Post%20Disaster%20Food%20Surveillance%20Guidelines.pdf> (you may have to cut and paste this link)
- Emergency Action Plan for Retail Food Establishments (Prepared by the 2014 Council for Food Protection):
  - <http://www.foodprotect.org/media/guide/Emergency%20Action%20Plan%20for%20Retail%20food%20Est.pdf>
- Questions/Concerns:
  - Email: [chs@houstontx.gov](mailto:chs@houstontx.gov)
  - Phone: 832 393 5100 (during normal business hours)
  - Fax: 832 393 5208