Isaac tests
HSDRRS
System performs as designed (3)

EOC stacks up well
against storm
Lead ensures ops success (9)
2012 Stellar Year for Corps

It was quite a year for the men and women of U.S. Army Corps of Engineers, New Orleans District.

We accomplished a lot in furthering the Hurricane and Storm Damage Risk Reduction System (HSDRRS), ensuring that our nation’s most critical inland waterways remained safely navigable, and continuing our efforts to protect and restore our country’s hardest working wetlands.

We also successfully responded to the first real test of the HSDRRS. With the Nation and world watching, every component of the 133 miles of levees, floodwalls, gated structures and pump stations that comprise the greater New Orleans perimeter system held its own during Hurricane Isaac. Major projects like the Inner Harbor Navigation Canal-Lake Borgne Surge Barrier, Gulf Intracoastal Water Way (GIWW) West Closure Complex, Seabrook Floodgate Complex and the Outfall Canals Interim Closure Structures provided visible proof that New Orleans now has the greatest level of risk reduction in its history. We can all take great pride in the success of the system.

Your dedication and determination over the last seven years combined with the many members of emergency management teams was crucial in successfully executing emergency operations.

We also performed an assessment after Hurricane Isaac to evaluate whether or not construction of the HSDRRS had any impacts on communities outside the 100-year system. In this assessment, we modeled Hurricane Isaac with and without the HSDRRS in place, as well as the characteristics of the storm that made Isaac unique.

The assessment was conducted by the best engineers and scientists from the New Orleans District, Mississippi Valley Division; Engineering Research and Development Center, the National Weather Service, and was subject to two over-the-shoulder reviews by the Water Institute of the Gulf and the Southeast Louisiana Flood Protection Authority-East. It is now being subjected to the rigors of an Independent External Peer Review and we anticipate receiving their findings this spring.

This effort indicated that the storm’s impacts on areas outside of the HSDRRS would have been similar with or without the 100-year system in place. The model results are consistent with the modeling that was conducted prior to starting construction of the system.

Additionally, the information obtained from the effort further indicates that every storm is unique. Though only a Category 1 hurricane, Isaac was a large, slow-moving storm with a track west of the HSDRRS. Moving at a pace three- to four-times slower than Hurricane Katrina, the greater New Orleans areas was subjected to tropical force winds for nearly 45 hours. The storm’s significant rainfall, averaging between eight and 12 inches throughout the area, occurred at the same time as the maximum storm surge. As a result, a large amount of water was pushed into coastal Louisiana and Mississippi over a long period of time. In some areas, Hurricane Isaac’s water levels exceeded those of Hurricanes Katrina and Gustav.

Regardless of the challenge, district successes are a testament to the hard work and dedication of its professionals – both active-duty Army and civilian team members. Well done!

Essayons!
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Cover: The West Closure Complex pump station pumping out interior drainage water on Aug. 30, 2012, one day after Hurricane Isaac made landfall. (Photograph by Paul Floro)

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Features

3 **Tested by Hurricane Isaac**
New Orleans system faced its first major storm when Hurricane Isaac made landfall on Aug. 29, 2012

7 **Post-Isaac Assessment**
Modeling following storm confirms risk reduction system performed as designed

9 **Mike Stack**
Emergency Operations Center Chief leads response to Hurricane Isaac

13 **Strong Record of Success**
Preparation and teamwork allowed the U.S. Army Corps of Engineers to successfully utilize Outfall Canals risk reduction structures during Hurricane Isaac
Hurricane Isaac first made landfall on Aug. 28 at the mouth of the Mississippi River, and then again on Aug. 29 at Port Fourchon. While a Category 1 storm on the Saffir-Simpson scale, Isaac's winds created substantial storm surges and deposited an enormous amount of rainfall on the region as it moved slowly inland. The path and speed of Isaac tested all aspects of the greater New Orleans Hurricane and Storm Damage Risk Reduction System. The newly constructed, $14.6 billion system operated as designed, and all major risk reduction structures in the system were closed — all associated pumps were operated.

For the first time, the IHNC Surge Barrier, GIWW West Closure Complex, Seabrook Floodgate Complex, and Bayou Segnette Complex were closed and operated in a tropical storm event.

The IHNC Surge Barrier held back storm surges of 13.6 feet, preventing water from entering the interior canals of the city. Hurricane Katrina's peak surge at this location was 15.5 feet; this comparison alone shows that Hurricane Isaac was a true test for the system. The West Closure Complex held back storm surges of 5 feet and pumped out interior drainage water at an astounding rate.

The tried and true Outfall Canal Interim Closure Structures also performed in the face of Hurricane Isaac's relentless rainfall. These structures not only held back the high water levels in Lake Pontchartrain, but also pumped out vast amounts of interior drainage water, allowing the Sewerage and Water Board of New Orleans to operate their pumping system full bore.

While the HSDRRS provided risk reduction for the greater New Orleans area within the perimeter system, low-lying communities outside the system experienced devastating storm surge and rainfall flooding. In areas west and north of the lake, storm surge flooded communities and rainfall overwhelmed streams and rivers. These issues were exasperated when high water levels in Lake Pontchartrain would not allow this water to drain naturally for several days after the storm.

Hurricane Isaac’s impacts to the coastal Louisiana area, including New Orleans and surrounding communities were considerable.
Post-Hurricane Isaac Assessment:
Modeling confirms the HSDRRS had little impact on areas outside the system

by Ricky Boyett
When Hurricane Isaac struck Southeast Louisiana on Aug. 29, 2012, impacts to the coastal area were considerable.

While the Hurricane and Storm Damage Risk Reduction System performed as designed, some areas outside the 100-year system experienced substantial flooding. On Aug. 31, the Corps began a scientific assessment to identify what impacts, if any, the 100-year HSDRRS had on communities outside the system during Hurricane Isaac.

Even though Hurricane Isaac was only rated a Category 1, it was a large, slow-moving storm that produced large amounts of surge and rainfall over Southeast Louisiana and coastal Mississippi. The storm churned over the area with tropical storm-force winds for 45 hours coming from the south and southeast. This, combined with a slow forward motion, large maximum wind radius, and intense rainfall occurring at the same time as the maximum surge, resulted in large amounts of water being pushed into coastal Louisiana and Mississippi. In many areas outside the 100-year HSDRRS, water levels exceeded those from higher category storms such as Hurricanes Katrina and Gustav.

Isaac provided a significant test for the newly-constructed HSDRRS, and the system performed as designed.

Hurricanes rotate in a counter clockwise motion. Areas on the eastern side of the hurricane typically receive the greatest impacts. Unlike Katrina, Hurricane Isaac’s track was to the west of New Orleans, putting the city and surrounding communities in the worst position for the storm.

**Post-Isaac Analysis**

The Corps conducted a scientific assessment to determine any potential impacts the greater New Orleans 100-year HSDRRS may have had on areas outside the system during Hurricane Isaac. This report was developed by the best scientists and engineers from the New Orleans District, the Corps’ Engineer Research and Development Center, and the Mississippi Valley Division with assistance from the National Oceanic and Atmospheric Administration, and the National Weather Service.

During development of the assessment, the Water Institute of the Gulf and the Southeast Louisiana Flood Protection Authority-East conducted “over the shoulder” reviews of the work.

The assessment’s findings indicate Hurricane Isaac’s impacts on communities outside the HSDRRS would have been similar with or without the system being in place. In general, the 100-year system’s impact on peak water levels in these communities was one inch or less.

The Corps’ assessment is now being subjected to the rigors of an Independent External Peer Review by the Louisiana Water Resources Council, a group of independent scientists and engineers. Their report is expected this spring.

The Seabrook Floodgate Complex on Lake Pontchartrain is designed to work in tandem with the Inner Harbor Navigation Canal (also known locally as the Industrial Canal) Lake Borgne Surge Barrier to prevent storm surge from entering the interior of New Orleans.

The structure’s sector gate and two lift gates remain open throughout the year, closing only when the area is threatened by a tropical weather event.

During Hurricane Isaac the area was subjected to more than 45 hours of tropical storm force winds. The Seabrook Floodgate successfully stopped any surge from entering the canal and flooding areas that were hardest hit by Hurricane Katrina, including New Orleans East, metro New Orleans, Gentilly, the Ninth Ward and St. Bernard Parish.

The Seabrook Floodgate Complex consists of a 95-ft wide navigable sector gate and two 50-ft wide non-navigable vertical lift gates with floodwall tie-ins on the east and west sides.

Other components of the Seabrook Floodgate Complex include the upgraded Alabama Great Southern Railroad gate, new T-walls that tie into the Orleans Metro perimeter system and the raised Hayne Boulevard ramp.

The total construction value for the Seabrook Floodgate Complex is an estimated $165 million.
Following Hurricane Katrina, the Inner Harbor Navigation Canal (IHNC) Surge Barrier was constructed to prevent Lake Borgne storm surge from entering into the IHNC and Gulf Intracoastal Waterway (GIWW).

The largest design-build project in U.S. Army Corps of Engineers’ history was operated for the first time during Hurricane Isaac. The 26-foot tall barrier performed as designed, preventing surge in excess of 13 feet from entering the interior of the system. Without the barrier in place, this surge would have overtopped the floodwalls that line the canal.

The structure also consists of a bypass barge gate and a flood-control sector gate (each 150 feet wide) and a 56-foot-wide vertical lift gate. The surge barrier has floodwall tie-ins to the New Orleans East risk reduction system and St. Bernard Parish.

The Bayou Bienvenue gate allows recreational boats to pass to and from Lake Borgne, while the sector gate at the GIWW is the main passage route for shallow draft navigation. The barge gate was constructed to serve as the temporary passage route for shallow draft navigation on the GIWW during sector gate construction.

The total construction value for the IHNC-Lake Borgne Surge Barrier is an estimated $1.1 billion.

Above: View of the 56-foot-wide vertical lift gate at Bayou Bienvenue. (USACE photograph)

Below: The 1.8 mile Inner Harbor Navigation Canal-Lake Borgne Surge Barrier, located in New Orleans, La. (USACE photograph)
Driving back from Morgan City, La. Thursday evening, having cut out of the Low Water Inspection early to start preparing, the 33-year-old University of New Orleans graduate couldn’t help but wonder what the next few days had in store for him.

As the Chief of the U.S. Army Corps of Engineers, New Orleans District Emergency Management Office, Mike Stack was keeping track of Hurricane Isaac as it approached the southeast Louisiana coastline nearly a week before it made landfall which, ironically, fell the day before the anniversary of a devastating Katrina seven years prior.

The days leading up to and during a storm are long in Stack’s world. He was typically up by 4:30 a.m., received quick updates from his night shift, grabbed coffee, worked with his team to prepare, and then attended commander’s briefings where plans for the day were laid out. If lucky, he had a chance to grab a bite to eat at some point during the morning.

“It seemed like the first couple of days after we activated the emergency operations center, every time I got a chance to look out the window it was nighttime,” he reflected.

The Thursday prior, however, he and his Emergency Management team were only gearing up to execute some preparedness actions in the Corps’ emergency operations plan since; at that point, they didn’t think Isaac was going to hit the area. But things change rapidly in the world of storm watching, and Isaac was no different. It was soon apparent that it would not only roll directly over the greater New Orleans area, but that it would bring with it Category 1 strength.

“On Sunday morning, when the National Weather Service updated the forecast, it basically pointed it right at us,” remembered Stack. “That’s when we knew the plan would go into effect -- we started construction closures that morning. The problem was that we only had two to three days to do it when we had always planned for five. So we had to start coming up with new ideas on how to get things done.”

“We spend much of the year preparing for storms we hope never arrive,” he said. “If an event comes up, we’re ready to get everybody spun up quickly on what’s going on, both with the specific threats of the storm, and the current status of the system in the field.”
“It’s a challenge. You have to figure out who you need, where they are, and what they’ll need to get ready,” he continued, “which is especially difficult to do on a weekend.”

Once up and running, a big chunk of every emergency operations day -- following the commander’s early-morning brief -- is executing the mission. This means problem solving and working with the team on future planning, explained Stack.

“Throw in a few teleconferences, media interviews, lots of phone calls, trying to keep up with emails, and grabbing a quick lunch – and before you know it you’re back at the evening commander’s brief, then the commanding general’s brief, followed by another round of interviews, phone calls, emails and such. At some point you look up and it’s 2 a.m.,” said Stack.

Another major part of a successful emergency operations program, he said, is the ability to work with counterparts at the local, state and federal level.

“I think it deserves a lot of credit,” said Stack, a 10-year veteran with the Corps. “You have to build relationships before an event in order to be ready to respond; you don’t want to be meeting people for the first time as a hurricane is approaching. Understanding each other, our priorities and concerns allowed us to work together to respond effectively. Also, having a history and an established relationship with somebody gives you a better understanding of what to expect from them when the time comes. I think it was a huge benefit that we went through the flood last year working together with the state, levee districts and all the parishes.”

During Isaac, the various agencies worked together to close the Hurricane and Storm Damage Risk Reduction System surrounding the greater New Orleans area because each had different parts
of it under their control. All were decisive in the process.

Of particular note was the Corps’ relationship with the state’s emergency operations center or GOHSEP.

“It was critical,” he said, “since we both managed major response operations around the area and we needed to make sure our efforts were synchronized to provide the most benefit to the most people.”

But the most important relationship, said Stack, was that shared between Parish EOCs and the Corps’ local government liaisons. “They were the eyes and ears on the ground, the subject matter experts, those who were out there understanding and responding to the needs of the public during the event. I think the liaison program has been one of the most successful programs we’ve done since Katrina, and it’s a huge reason why we were able to respond to Isaac so successfully.”

Looking back on the performance of the emergency operations team and the system, Stack is pleased with the execution but says there’s always room for improvement noting that several components of the plan will be revisited in the coming months in an effort to streamline operations.

“Isaac presented some interesting scenarios around the system that we hadn’t really fully incorporated into the planning of how we were going to operate the structures,” said Stack. “But the teams out in the field did a great job of reacting. Whether it’s the guys at the Outfall Canals going out in the storm to make the pumps work; the Hired Labor crews putting in the highway closures in the middle of the night; or the structure teams at places like the West Closure Complex and Bayou Segnette getting the gates closed in the middle of torrential rains, ultimately it’s the teams out in the field reacting to whatever is thrown at them that make these kinds of operations successful.”

Besides preparation exercises and preliminary run-throughs Hurricane Isaac would be the first time the Corps and its partners fully operated the HSDRRS. Being the first time out of the gate so to speak, Stack confided that he and many of his peers “expected some complications here and there. But the system performed almost flawlessly.”

“Granted, Isaac wasn’t a storm that pushed the system to its limits,” he said. “However, just getting the system closed before the storm was a feat in and of itself, and we really didn’t have many issues – everything closed and performed like it was supposed to.”

In the end, the preparation, communication and teamwork among every single person involved in responding to Hurricane Isaac paid off. The HSDRRS was operated effectively and performed exactly as it was designed, according to Stack.

“We talked a lot about trust,” Stack emphasized regarding the system and team. “That’s really the only way you can get through it when you have so many things to do and so little time to do them. Trusting that the person next to you is doing their job.”

Above: Prior to Hurricane Isaac’s landfall, crew members place HESCO baskets at the Leroy Johnson floodgate to close construction gaps. (Photograph by Paul Floro)

Above: Prior to the 2012 hurricane season, Corps personnel and local partners run a full-scale hurricane exercise to ensure all components of the HSDRRS function properly. (Photograph by Paul Floro)
Early Sunday Aug. 26, 2012, officials shifted the forecasted track for Hurricane Isaac west toward the mouth of the Mississippi River.

By midday Monday, nearly a dozen local, national and international media satellite trucks were encamped at the U.S. Army Corps of Engineers’ 17th Street Outfall Canal Interim Closure Structure (ICS); a tell-tale sign that the storm would be making landfall near New Orleans. When the operational triggers were reached on Tuesday, the Corps closed the structure’s 11 gates and began pumping the city’s internal drainage water into Lake Pontchartrain. This would be the third time since 2008 that the structure was operated successfully during a named storm.

“In addition to operating the 17th Street and London Ave. outfall canal structures during Hurricanes Gustav and Ike, London was closed last year during Tropical Storm Lee,” stated Chris Accardo, chief of the New Orleans District’s Operations Division. “Every time we have needed to use them, the structures have performed.”

Throughout the year, the Corps’ Canal Teams train so that they are prepared for anything that may arise during a storm event. Once a month, the structures and pumps are tested. The only exception is during hurricane season; then they are tested a minimum of twice a month.

Continuous training provides each member of the canal team with a detailed knowledge of the structure and its many moving parts. During a storm, anything may arise and they need to be prepared to respond. For example, early Wednesday morning, the crew at the 17th Street Outfall Canal structure needed to turn on additional pumps to match that of the Sewerage and Water Board of New Orleans (S&WB). Yet, when the button was pushed nothing happened. Realizing that automatic ignition had malfunctioned, the team members left the safety of the control room to manually start the pumps. In two short but pressure-filled hours, the team had the pumps operating before the water could exceed the canal’s maximum water level.

STRONG RECORD OF SUCCESS

CORPS OUTFALL CANAL TEAMS SUCCESSFULLY DEFEND AGAINST 4TH NAMED STORM.

by Ricky Boyett

Above: Jim Cantore with the Weather Channel interviews MVN district Commander Col. Ed Fleming at 17th Street Outfall Canal prior to Hurricane Isaac’s landfall. (Photograph by Ken Holder)
“Our guys really came through for us during the storm,” remembered Ray Newman, Canal Captain for the 17th Street ICS. “To get out there during the peak of the storm and start those pumps as quickly as they did was impressive.”

The three outfall canals in New Orleans are vital drainage components for a city that has several neighborhoods below sea level. Under normal conditions, these canals are used by the S&WB to evacuate rainwater that has accumulated in the interior of the city. Once the water is pumped into the canal, it drains unimpeded into Lake Pontchartrain. However, during a tropical weather event, the Corps closes off the mouth of the canal to prevent surge from entering the interior of the city.

To close the canals to surge, the Corps constructed closure structures at the mouths of the London Ave., Orleans Ave., and 17th Street outfall canals. By lowering the structures’ gates, the Corps provides the canal with 100-year level storm surge risk reduction.

Each structure also consists of pumps that are designed to match the S&WB’s pumping capacity located at the opposite end of each canal. The structures pump the internal drainage water around the closed gates and into Lake Pontchartrain, allowing the S&WB to continue using the canals for internal drainage during a storm despite its closure at the lakefront.

While the operations at the London Ave. canal were more by the book during the hurricane, the crew at the Orleans Ave. Canal structure also had a surprise in the form of a small fire. A hydraulic line into one of the pumps fractured, sending fluid onto an engine turbo. The team responded quickly and doused the flames in a couple of minutes. In less than an hour, they made the repairs and had the pump back in operation. During the repairs, the S&WB never had to slow or reduce their pumping into the canal.

Moving four times slower than Katrina, Hurricane Isaac pounded the New Orleans area with wind, rain and surge for more than 40 hours. The lake and canal waters finally equalized on Sept. 2, 2012 and the closure gates were reopened. For nearly five days, the Corps and S&WB had worked successfully as team to ensure that the storm surge stayed in the lake and the rainwater was evacuated from the city's interior.

These temporary structures will soon be replaced with the Permanent Canal Closures and Pumps. Though the pumps will only have a few more seasons before they are replaced, it is critical that they remain ready to provide the lakefront portion of New Orleans with 100-year protection until the PCCP are fully operational.

“While these are only temporary structures, our crews are very aggressive in ensuring that they are well-maintained,” stated Accardo. “We will have them ready to go for as long as they are needed.”