

LAST LINE OF DEFENSE: HOPING THE LEVEES HOLD

Army Corps of Engineers officials say hurricane levees in the New Orleans area will protect residents from a Category 3 hurricane moving rapidly over the area. But computer models indicate even weaker storms could find chinks in that armor.

BARRIERS OF EARTH AND CONCRETE

Levees and floodwalls that protect against flooding from both the Mississippi River and hurricanes are built by the Army Corps of Engineers and are maintained by local levee districts. The corps and the local districts share the construction cost of hurricane levees, while the Mississippi River levees are a federal project. Local levee districts also build and maintain nonfederal, lower-elevation levees with construction money from each district's share of property taxes and state financing.

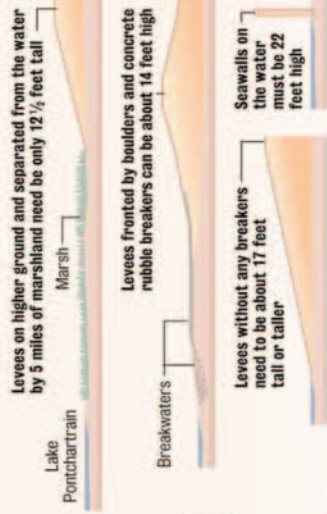
LEVEES AND FLOODWALLS

- Mississippi River
- Hurricane protection
- Interior parish

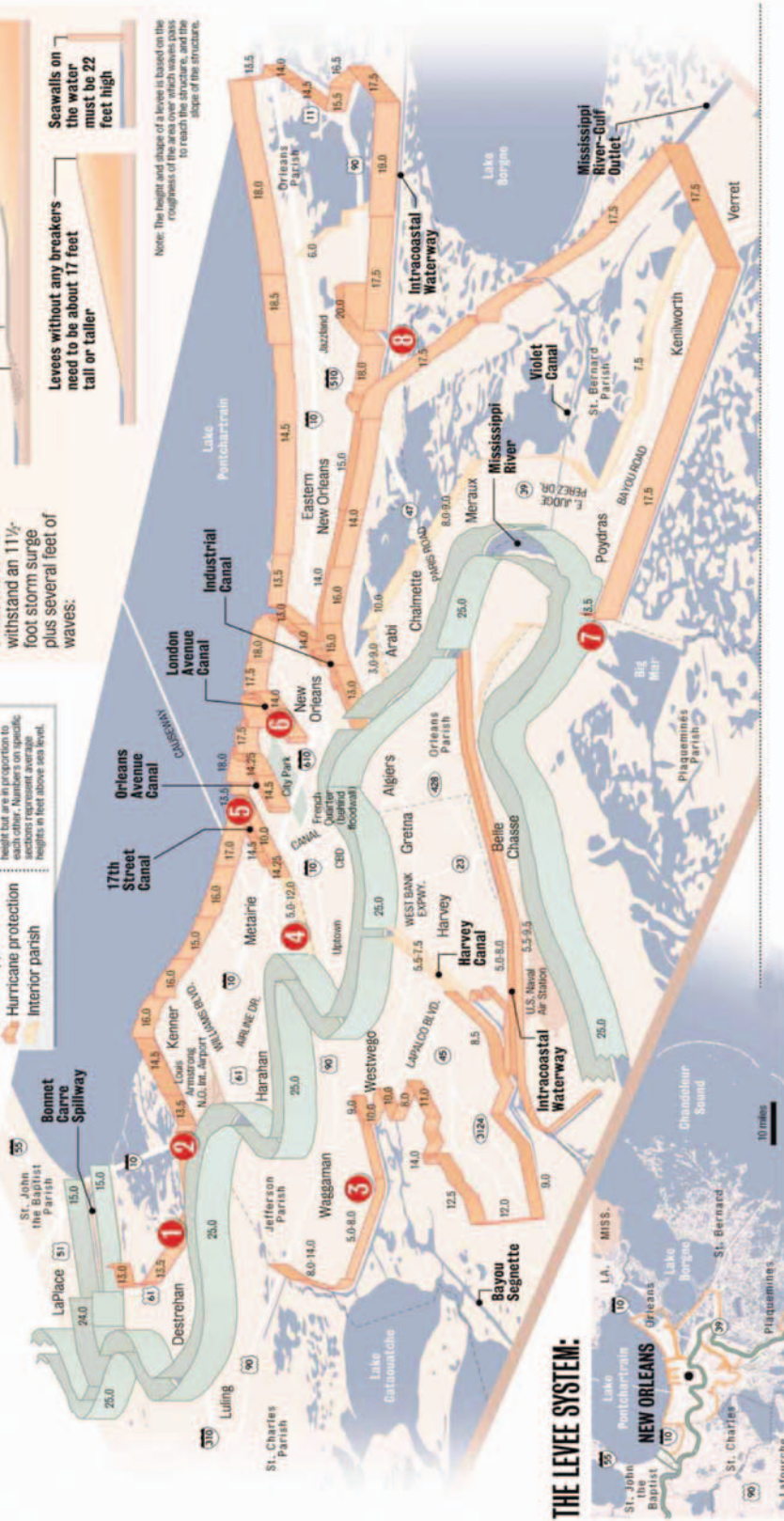
Notes: Levee and floodwall heights are shown in feet above sea level. Floodwall height is shown in feet above sea level. Floodwall height is shown in feet above sea level. Floodwall height is shown in feet above sea level.

HEIGHT ISN'T EVERYTHING

Different factors permit Lake Pontchartrain levees of varying elevations to withstand an 11 1/2-foot storm surge plus several feet of waves:



Note: The height and shape of a levee is based on the roughness of the area over which waves pass to reach the structure, and the slope of the structure.



THE LEVEE SYSTEM:

Levees: Who's in Charge?

An Overview of Levees in Southeast Louisiana

Levees are large embankments, usually of earth or stone, that make up part of the flood-control system designed and built to protect New Orleans from hurricanes and floods. Levees line the Mississippi River, the shores of Lake Pontchartrain, and the Mississippi River Gulf Outlet (MRGO), and are part of the protective rings around New Orleans East and St. Bernard Parish.

Other structures may also be used to protect an area from flooding. The Army Corps of Engineers (the Corps), sometimes in concert with local and state government and sometimes on its own, built floodwalls, drainage canals, pumps, and floodgates to control the flow of excess water in and around the city.

- Floodwalls, which are high vertical walls built of concrete and steel, are used in more urban areas because they do not require as much space as earthen levees with their wide foundations.
- Because floodwater will find its way through any breaks in the levees, massive gates are located throughout the system wherever there are openings for streets or railroads. These gates are closed in anticipation of “high-water” events such as very high tides, floods, and hurricanes.
- Because many parts of the region are at or below sea level, many areas also have a system of pumps and canals to remove rain and floodwater from areas protected by the levee system.¹

All of these systems – more than 200 gates and 125 miles of levees and floodwalls – worked together to form the flood-control system that was designed to protect metropolitan New Orleans from storms like Hurricane Katrina.²

The Roles and Responsibilities of the U.S. Army Corps of Engineers, the Orleans Levee District, and the Louisiana Department of Transportation and Development

The U.S. Army Corps of Engineers

Levee systems of the size needed to protect the New Orleans area are often collaborative efforts between federal and local governments.³ The federal role in such projects is carried out by the Corps, an agency within the Department of Defense (DOD) charged with both military and civilian missions.⁴ Military missions are assigned within the military command structure, while civilian flood-control projects are authorized by Congress in legislation.⁵

Flood-control projects usually begin when a community feels a need for protection and contacts the Corps. If the Corps does not already have the statutory authority to respond, then Congress may grant it. After initial studies, the Corps may enter into a project-cooperation or assurance agreement with a local sponsor acting on behalf of the community. The assurance agreements for projects generally set forth roles of the parties, including payment obligations, design and construction responsibilities, and operations-and-maintenance (O&M) duties before and after the project is complete.⁶

The levee system that protects most of New Orleans, including areas that experienced major breaches and flooding during Katrina – such as the 17th Street and London Avenue Canals, New Orleans East, and most of St. Bernard Parish – is a Corps project called the Lake Pontchartrain and Vicinity Hurricane Protection Project (Lake Pontchartrain Project). There are several other federal cost-shared projects that protect other parts of southeastern Louisiana.⁷ The Corps' involvement in these projects was mostly through its New Orleans District, one of the Corps' largest with more than 1,200 employees, and part of the Corps' Mississippi Valley Division headquartered in Vicksburg, Mississippi.⁸ When Katrina made landfall, the New Orleans District was under the command of Colonel Richard P. Wagenaar, who had assumed control only six weeks before.⁹

The assurance agreements for the Lake Pontchartrain Project made the Corps responsible for designing and constructing the project. Local sponsors provided the land for levee construction and rights-of-way, and agreed to share the cost. The Corps was to turn the completed project over to the local sponsors for O&M consistent with the Corps' standards, i.e., making sure the flood-control system actually works on a day-to-day basis and protects those living inside the system.¹⁰ To help the local sponsor do this, the Corps is required by its rules and regulations to provide the local sponsor with an operations manual¹¹ and then conduct annual inspections to be sure the local sponsor is doing what it is supposed to do.¹²

In addition to its authority to build flood-control projects, the Corps also has statutory authority in federal cost-share flood-control projects like the Lake Pontchartrain Project to act in anticipation of, or response to, flood emergencies. In this role, the Corps may help the local sponsors deal with the flood threat to the levee system, and aid state and local governments trying to prevent flood damage. This “flood-fighting” authority is authorized by Public Law 84-99, also known as the “Flood Act.”¹³ In the days following Katrina, the Corps used its Flood Act authority to close off the levee breaches at the 17th Street and London Avenue Canals, which were filling the city with water, and to make other emergency repairs.¹⁴

The Orleans Levee District

One of the local sponsors for the Lake Pontchartrain Project was the Orleans Levee District, one of the first five levee districts created by the state in 1879. The levee districts, which were established to be a funding source for and to ensure local involvement in levee construction and operation,¹⁵ all had the same general duty: to do what was necessary to “insure the thorough and adequate protection of the lands of the district from damage by flood ... for the adequate drainage control of the district.”¹⁶

Like the Corps under the Flood Act, the levee districts have broad statutory obligations in addition to their obligations under their assurance agreements on individual levee projects. For example, regardless whether a project was being designed and constructed by the Corps or had been turned over for O&M to the local sponsor, state law charged the levee districts with adopting rules and regulations for maintaining a “comprehensive levee system.”¹⁷ State law authorized them to obtain engineering assistance from the Louisiana Department of Transportation and Development (LA DOTD) in Baton Rouge if they needed additional technical expertise.¹⁸ State law also required levee-district board members to attend once during their term in office an educational program on how to care for and inspect levees.¹⁹

To carry out their primary duty of flood control, state law not only authorized the levee districts to serve as local sponsors for federal cost-share projects, but also to raise money pursuant to taxing and bonding authorities. The Orleans Levee District, uniquely, was also authorized to engage in various business enterprises,²⁰ making it an entity with some governmental qualities (taxing and bonding authority) and some corporate qualities – the

authority to engage in for-profit businesses like operating the Lakefront Airport, running two marinas along Lake Pontchartrain, and leasing dock space to a riverboat casino.²¹

The revenues the Orleans Levee District earned from the businesses and its taxing and bonding authority were substantial. The Orleans Levee District financial statements for the fiscal year ending June 30, 2005, show it collected more than \$24 million from property taxes and \$14 million from its business-type activities in the previous 12 months.²² The same report said the district had \$21 million in unallocated general funds and \$13 million in a “special levee improvement fund.”²³ The levee improvement fund, according to the levee district’s former president, James Huey, could “only be used for flood protection projects and/or flood-related projects.”²⁴

Although the levee district’s primary responsibility was flood protection, it spent large amounts on non-flood related activities (e.g., licensing a casino, or operating an airport and marinas, or leasing space to a karate club, beautician schools or restaurants) rather than applying the money to flood protection or emergency preparedness.²⁵ For example, the Orleans Levee District’s Emergency Operations Center (EOC) sat outside the protection of the levee system at the Lakefront Airport, vulnerable to the very hurricanes the levee system was designed to protect against.²⁶ For years the district had studied moving its EOC inside the flood protection system, but never did.²⁷ The levee district’s Chief Engineer, Stevan Spencer, described the situation as a “very bad joke” that dated back to at least 1998, when Hurricane Georges flooded the airport.²⁸ Spencer said “there was never funding” to move the EOC.²⁹ Yet in 2003, the Orleans Levee District spent \$2.4 million to repair the “Mardi Gras Fountain” in a park near Lake Pontchartrain.³⁰ When Katrina made landfall, Orleans Levee District staff had to be rescued, mostly by boat, from the flooded EOC at the airport³¹ before they could survey damage or assist with repair efforts at the 17th Street and London Avenue Canals.

The Orleans Levee District was also aware of a levee in New Orleans East that was considered to be three feet below its design height.³² Levee-district board minutes and conversations with Corps personnel suggest that paying for repairs to this low levee was considered to be the Corps’ responsibility.³³ Federal funding was unavailable, but instead of paying for the repairs itself and asking for reimbursement from the Corps, as it had with previous projects,³⁴ the levee district merely sent letters to its Congressional delegation asking for federal funding.³⁵

Pressed to explain how the Orleans Levee District made spending decisions, Huey offered no direct explanation, but focused on the district’s multiple obligations – not only was the district responsible for flood control, but it also had statutory requirements to maintain recreational space and was authorized by state law to engage in non-flood related business ventures.³⁶ A review of the levee-district board minutes of recent years revealed that the board and its various committees spent more time discussing its business operations than it did the flood-control system it was responsible for operating and maintaining.³⁷

The Louisiana Department of Transportation and Development (LA DOTD)

Though not a party to the assurance agreements for the Lake Pontchartrain Project, LA DOTD and its Office of Public Works (OPW) have statutory responsibilities to assist and oversee certain levee district functions. State law tasks LA DOTD with approving any activity that might compromise the levees,³⁸ and with administering training sessions to levee-district board members and their inspectors on caring for and inspecting levees.³⁹

To the extent training sessions were held, they were organized by the Association of Levee Boards of Louisiana, an organization that lists Edmund Preau as its Secretary-Treasurer.⁴⁰

Preau is an Assistant Secretary in LA DOTD and leads the OPW within the Department, which is responsible for LA DOTD's levee-related activities.

When James Huey, who served on the levee district's board for more than 13 years (nine as president), was read the section of state law describing the training requirement, he said it was the first he had heard of it.⁴¹ Huey explained: "You know what that is? That's going up to a workshop for a weekend and having a crawfish boil up here and hear a couple people talk about some things and they get a little piece of paper and they honored the law."⁴² Huey was then asked whether the Association sessions addressed how to inspect levees. He responded, "No, nothing."⁴³

LA DOTD also had the statutory responsibility to "review" each levee district's emergency-operations manual every two years.⁴⁴ According to Preau, this review entailed checking whether relevant contact information had been updated and whether the levee district had included any new flood-control systems within its jurisdiction in its planning.⁴⁵ The review entailed no assessment of whether the levee district had stockpiled materials or had the personnel necessary to assess an emergency and respond accordingly.⁴⁶ Preau said he assumed any more elaborate review would have been done by the Louisiana Office of Homeland Security and Emergency Preparedness (LOHSEP).⁴⁷

Louisiana's Emergency Operations Plan (EOP) made the LA DOTD the primary state agency overseeing Emergency Support Function (ESF-3), Public Works and Engineering. ESF-3 encompassed critical infrastructure in the state, including the "construction, maintenance and repair of state flood control works."⁴⁸ ESF-3 also dictated that, "When an emergency is imminent, the ESF 3 Coordinator [who is to be designated by LA DOTD Secretary Johnny Bradberry] will assess the potential impact of the threat on the state's infrastructure and work with other authorities to ensure that any necessary immediate repairs or arrangements for critical structures and facilities are initiated."⁴⁹ ESF-3 also said, "As the emergency progresses, the coordinator will monitor the status of the infrastructure and effect emergency repairs where needed and feasible."⁵⁰

The LA DOTD did not acknowledge or accept its responsibility under ESF-3. Preau told Committee investigators that he didn't think the provision applied to LA DOTD: "I'm not sure what that means, because we don't have any state flood control works. State doesn't own any flood control works."⁵¹ By Preau's reading, a levee project was covered only if it was owned by the state, not simply if it was in the state. As Preau read it, LA DOTD had no responsibility to coordinate with levee districts on critical facilities like the Lake Pontchartrain Project. This response is problematic: the responsibilities articulated under ESF-3 are specifically delegated to the LA DOTD, and the plain language employed by the State's Emergency Operations Plan cannot be unilaterally dismissed as meaningless by the people it covers.

The result was that neither LA DOTD nor any state agency made sure that the state's levee districts were integrated into the state's emergency-planning process, much less genuinely prepared for an emergency. As a result, when Katrina made landfall, no Orleans Levee District personnel were located at, or in contact with, emergency managers in Baton Rouge; nor was any mechanism in place to request additional support from the state.

Notwithstanding Preau's insistence that the LA DOTD had no responsibilities under ESF-3 for the levee system, LA DOTD ultimately played an active role in efforts to close levee breaches in New Orleans in the aftermath of Katrina.

Design and Construction of the Lake Pontchartrain Project

During Katrina, levees and floodwalls were overwhelmed throughout the New Orleans area, and in several places were breached. Some of these failures occurred in parts of the Lake

Pontchartrain Project. Understanding the link between the breaches and the nature and organization of the Lake Pontchartrain Project requires some background.

Congress authorized the Lake Pontchartrain Project in the Flood Control Act of 1965 to provide hurricane protection to areas around Lake Pontchartrain in Orleans, Jefferson, St. Bernard, and St. Charles Parishes.⁵² The project called for design and construction of about 125 miles of levees and floodwalls to be completed by 1978 at a cost of \$85 million. The project was still not complete when Katrina hit, and its cost had grown to more than \$750 million as of 2005.⁵³

As authorized by Congress, the project was to protect the area from what the Corps called the “Standard Project Hurricane” (SPH), a model storm “based on the most severe combination of meteorological conditions considered reasonably characteristic of that region.”⁵⁴ The SPH was developed in 1959 by what was then called the United States Weather Bureau, which updated the SPH after the devastating impact of Hurricane Betsy in 1965. The SPH was revised again in 1970, 1977, and 1979 by the Weather Bureau’s successor, the National Oceanic and Atmospheric Administration (NOAA).⁵⁵ There is no evidence that design parameters of the Lake Pontchartrain Project were modified in light of NOAA’s changes to the reference-model storm.⁵⁶

Nevertheless, the Corps has repeatedly maintained that the SPH was the equivalent of a fast-moving Category 3 storm on the Saffir-Simpson scale – a measurement scale that rates the strength of hurricanes on a scale of Category 1 to Category 5, with Category 5 being the most intense. For example, at a press conference immediately after the storm, Lieutenant General Carl Strock, the Commander of the Corps and its Chief of Engineers, explicitly said that the Corps “knew” that the levee system “would protect from a Category 3 hurricane,”⁵⁷ and the page on the Lake Pontchartrain Project on the Corps’ website after Katrina said, “The SPH is equivalent to a fast-moving Category 3 hurricane.”⁵⁸

This claim is misleading: the Saffir-Simpson scale was not adopted until 1977, 12 years after the Lake Pontchartrain Project was authorized. Al Naomi, the Corps’ Senior Project Manager for the project, acknowledged that the Corps never conducted a formal study comparing the SPH to the Saffir-Simpson scale, so the claim that the Lake Pontchartrain Project provided Category 3 protection was at best a rough estimate, and at worst, simply inaccurate:

SPH has ... wind speed, central pressure, and surge. You go in and say what is my wind speed for an SPH? You look at it. It’s a very high Category 2 storm on the Saffir-Simpson Scale. I look at my central pressure for SPH. I go to the Saffir-Simpson Scale, it’s a mid-range Cat 4. I say, what is my surge? SPH surge in the lake at 11 and a half [feet] on the Saffir-Simpson, that is a Category 3 range. What am I going to tell the Rotary Club? What do I have? Generally in talking to the hydrologist, you can say it’s about equivalent to a fast-moving Cat 3. It’s not really that, but for their understanding that is what you can say. That is what we say. What happens is the press gets this and it says we have Cat 3 protection. That is not really true. It’s SPH protection which may be equivalent to a fast-moving Cat 3 storm.⁵⁹

However, the view that the hurricane protection system could protect the greater New Orleans region from a moderate and/or fast-moving Category 3 storm was widely held within the Corps’ New Orleans District. Prior to Hurricane Katrina, the New Orleans District issued numerous news releases to the general public (some of which are referenced below), stating that the hurricane-protection system provided some level of Category 3 protection:

- December 19, 2001, *N.O. hurricane bridge contract awarded, Corps, Levee Board will floodproof two bridges in Gentilly*: “The bridge floodproofing will protect neighborhoods along the London Avenue, Orleans Avenue and 17th Street Canals from storm surges from Lake Pontchartrain. The system of levees, floodwalls and bridges is designed to protect against fast-moving Category 3 hurricanes.”⁶⁰
- May 27, 2003, *Cross Bayou Drainage Structure to reduce flooding in St. Charles Parish*: “The structure is part of the Lake Pontchartrain Hurricane Protection Project and is the second of five such structures to be built in St. Charles Parish. . . . These contracts, to be completed in 2004, will result in a levee system that provides protection from a Category 3 storm for St. Charles Parish.”⁶¹
- August 21, 2003, *Filmore Bridge in Gentilly will reopen on Friday, Aug. 22. Mirabeau Bridge is closing Wednesday, Aug. 27 for hurricane floodproofing*: “The systems of levees, floodwalls and bridges is designed to protect against fast-moving Category 3 hurricanes.”⁶²

This view was also held by the Corps’ New Orleans District Commander (Colonel Wagenaar⁶³) and the District’s Emergency Manager (Michael Lowe⁶⁴). The same representations were made in more substantive Corps written materials.⁶⁵

Moreover, the Lake Pontchartrain Project, as it stood in the path of Katrina, was still not complete as designed. Some portions were still under construction, and soil subsidence (sinking) had left portions of the project with less elevation above sea level than intended. In other words, some elements of the project were not even high enough to protect against the Standard Project Hurricane, let alone a genuine Category 3 hurricane.

The Corps was well aware of this fact. As Jerry Colletti, the New Orleans District’s Manager for Completed Works explained, the Corps never tried “to provide full-level protection on an annual basis . . . we just can’t raise everything to the design height for each storm that would come through.”⁶⁶

Meanwhile, the National Weather Service (NWS) concluded from a new model of projected storm surges that the Lake Pontchartrain Project would be more vulnerable to hurricanes than previously thought – that more Category 3 and even certain Category 2 hurricanes would overtop parts of the levee system and produce flooding.⁶⁷ Dr. Wilson Shaffer, who studies storm surges at NWS, said this discovery was shared with the Corps, perhaps as early as 2003, but certainly by 2004. The findings were also shared with LOHSEP and with state and local emergency managers at the Louisiana Emergency Preparedness Association’s June conferences in 2004 and 2005.⁶⁸ At a minimum, this information should have prompted a fresh look at the adequacy of the Lake Pontchartrain Project, but like the NOAA updates to the Standard Project Hurricane in the 1970s, it does not appear that either the state or the Corps took any action to respond to the new information.

Effect of Subsidence on the Level of Protection

As noted earlier, the level of protection provided by the levee system was affected not only by its design, but also by geologic subsidence, or soil sinking. The entire coastal region of Louisiana had been subsiding for millions of years, as the enormous weight of the sediments continually deposited by the Mississippi River enters the Gulf of Mexico, pushing down on the earth’s crust. Human activities like extracting oil and natural gas, pumping water, raising buildings, and even adding to levees and floodwalls all accelerate subsidence. (See Chapter 9.) As the entire region subsides, the effective height of the levees above sea level,

and thus the level of protection they provide, decreases.⁶⁹ A recent report concluded that a section of levee that was overtopped and failed during Katrina was nearly three feet below its design height.⁷⁰

All of these factors should have persuaded the Corps to reconsider its public claims that the Lake Pontchartrain Project provided Category 3-level protection.

Operation and Maintenance (O&M)

Maintaining a flood-control system is essential, but is complicated in southeast Louisiana by the recurring need to rebuild levees to compensate for subsidence. The Corps is not supposed to turn over a project until it is complete; until then, the Corps is responsible for O&M.⁷¹ Once a project is turned over, the local sponsor must conduct O&M to Corps standards “to obtain maximum benefits.”⁷² This includes checking for “undue settlement” of the levee, water seeping through or under it, and growth of damaging brush, and taking immediate action to address potential emergencies.⁷³

Because the Lake Pontchartrain Project was not complete, according to the Corps’ Senior Project Manager for the project, Alfred Naomi, it had been formally turned over to the local sponsor, but remained in an “interim” status:

There are still pieces that have to be done. We are not going to turn over a piece of the project until every piece in that ring of protection is completed. If there is one little thing left to do I think by regulation – I could be wrong. I think we have to have the entire system 100 percent complete so we turn over the entire segment that is protected, a certain area of the city.⁷⁴

Nonetheless, the Corps did nominally turn over parts of the project to local sponsors to maintain when it determined that construction on that particular part or “reach” was complete.⁷⁵ The Corps sent letters to the Orleans Levee District and others to this effect, informing each district that it now had O&M responsibility for that unit.⁷⁶ Personnel within the Corps’ New Orleans District referred to these letters as “turnover letters” even though they were not the “official total project completion turnover” letters.⁷⁷ The Orleans Levee District did not respond to these letters or even acknowledge their receipt.⁷⁸

When the Committee asked for copies of the de-facto turnover letters, it received only a limited response. The letters submitted did not cover the entire project, and some were pre-1965, before the project was even authorized.⁷⁹ In short, the exact legal status of the project segments and the degree to which the Corps and local sponsors like the Orleans Levee District were truly responsible for maintenance is at best uncertain.

Other conflicting and irregular procedures in the turnover process went beyond the turnover letters. The Corps was supposed to require local sponsors to report semi-annually to its District Engineer on inspection and O&M for the flood-control system.⁸⁰ Colletti, the Corps’ Operations Manager for Completed Works, explained that the Corps unilaterally decided not to require the Orleans Levee District to provide the report.⁸¹ In addition, for each completed work, the Corps is required to give the local sponsor an operations manual.⁸² Colletti said his office gave no such manual to the Orleans Levee District for levees and floodwalls, but merely provided a one-page set of guidelines similar to a part of the Code of Federal Regulations that detailed obligations of local sponsors.⁸³

The Corps’ observance of rules and regulations for completed projects took the form of a required annual inspection conducted around June 1 – the start of hurricane season – by representatives from the Corps, the Orleans Levee District, the LA DOTD, and other interested parties (e.g., the City and the Port of New Orleans).⁸⁴ These inspections appear to

have taken about four hours, covered at least a hundred miles of levees and floodwalls,⁸⁵ and would usually involve a motorcade that would stop at pre-determined spots to allow the group to look over an area and discuss issues.⁸⁶ The purpose of the inspections, according to the Corps, was to ensure O&M compliance by the local sponsor, but not to test the system's actual structural integrity or measure whether it was at design height.⁸⁷ Perhaps the most colorful explanation of the annual inspection was offered by former Orleans Levee District president Huey, who suggested that the event was more of a social occasion than a genuine technical inspection:

They normally meet and get some beignets [pastries] and coffee in the morning and get to the buses. And the colonel and the brass are all dressed up. You have commissioners, they have some news cameras following you around and you have your little beignets and then you have a nice lunch somewhere or whatever. And that's what the inspections are about.⁸⁸

Ineffective Inspection Regime

The weaknesses of this inspection approach can be seen in the last pre-Katrina annual inspection of the Lake Pontchartrain Project in May 2005. It apparently did not address some known vulnerabilities. The W-30 Floodgate along the Inner Harbor Navigation Canal had been destroyed by a train accident in 2004 by the New Orleans Public Belt Railroad.⁸⁹ This gate was intended to close off the levee at a point where the railroad track passed through it. The railroad had provided money for repairs,⁹⁰ but the floodgate was still broken when Katrina struck, even though Huey, then board president, told an April 5, 2005, levee-district board meeting that he considered the broken gate to be an "emergency."⁹¹ Under state law, Huey had the authority to address such emergencies without going through the standard contracting process.⁹² Asked why he did not use his emergency authority to repair the gate before hurricane season, Huey simply said, "I do not know. My bottom-line, straightforward answer: I don't know."⁹³

Another problem apparently not dealt with in the annual inspection was a levee in New Orleans East that was three feet short of its design height. Like the W-30 floodgate, the problem remained unaddressed when Katrina made landfall, even though Naomi, the Corps' Senior Project Manager, considered repair "vital" to protecting the city.⁹⁴ In addition, Corps rules and regulations for completed works require local sponsors, like the Orleans Levee District, to fix defects promptly.⁹⁵ Finally, the Corps' rules on levees require local sponsors to ensure that "No trees exist, the roots of which might extend under the wall and offer accelerated seepage paths."⁹⁶ However, one of the forensic teams investigating the levees' failure, and Corps officials, found trees growing along the 17th Street and London Avenue Canals.⁹⁷ In spite of the major defects requiring repairs, the Orleans Levee District's Chief Engineer said he expected the district to get "an outstanding review in regards to the maintenance of the levees" from the 2005 inspection.⁹⁸

The Committee learned during its investigation that the 17th Street and London Avenue Canal floodwalls weren't part of the 2005 inspection because they were inaccessible by car. It appears likely that they were never inspected by the Corps after construction was finished in the early 1990s,⁹⁹ partially because the floodwalls abutted private property, which made them difficult, but certainly not impossible, to access.¹⁰⁰ It seems likely that the only physical inspections they received would have been conducted by Orleans Levee District personnel mowing the grass, making visual inspections, and identifying problems like holes dug by wild animals, significant erosion, etc. The personnel responsible for this work received no specialized training on care or inspection of levees and floodwalls,¹⁰¹ and supporting documentation of these inspections comprised nothing more than worker timesheets indicat-

ing the work conducted, such as mowing the grass, the location of the work, and the hours spent doing the job.¹⁰²

When asked who was responsible for fixing problems once they were identified, Orleans Levee District leadership explained that there was an undocumented understanding that “major” problems would be brought to the attention of the Corps and “minor” problems would remain the responsibility of levee district personnel.¹⁰³ However, and as noted by the Orleans Levee District Chief Engineer, Stevan Spencer, the district’s total in-house, engineering expertise amounted to three engineers¹⁰⁴ – a level of expertise not on par with the challenges posed by the hurricane protection system within the jurisdiction of the Orleans Levee District.

The only other inspection the Orleans Levee District claims to have made of the levees was a field survey of floodwall heights every two to three years to check for subsidence.¹⁰⁵ If the Orleans Levee District did, in fact, conduct these surveys, it did not identify the severity of the subsidence along the 17th Street and London Avenue Canals documented by the Corps’ forensic team.¹⁰⁶ The Orleans Levee District certainly did not conduct any structural analysis of the floodwalls; nevertheless, when asked by the Committee about the quality of the Orleans Levee District’s operations and maintenance regime over the years, Colletti said that the Corps “felt that they’ve done an outstanding job.”¹⁰⁷

The Orleans Levee District’s O&M practices and the passive oversight by the Corps did not meet what experts consider to be the standard of care for a flood control system like the Lake Pontchartrain Project. For example, in a letter to the Committee, Dr. Ernst G. Frankel of the Massachusetts Institute of Technology explained that visual surveys are not sufficient because potentially catastrophic voids can occur well below the surface of the levees. To expose internal degradation, holes must be drilled in the levees to retrieve core samples for analysis. Acoustic equipment can be used to scan the density of material layers at various depths.¹⁰⁸ No entity conducted such an analysis of the New Orleans flood-control structures,¹⁰⁹ nor were efforts made by the Levee District to obtain equipment to improve its inspection regime.¹¹⁰ Professor Frankel added that inspection of levees below the waterline was also necessary to detect hidden threats to their integrity. The Orleans Levee District’s simple visual inspections failed in this respect as well.

Lack of Coordination with the Sewerage and Water Board of New Orleans

Because New Orleans and surrounding parishes are below sea level and ringed by levees, rain and flood waters that enter must be pumped out. The Sewerage and Water Board of New Orleans (the Water Board) has the responsibility for maintaining a system of pumps and canals for this purpose. (The Water Board also runs the municipal water and sewer systems.) Floodwalls along two of these drainage, or outfall, canals sustained major breaches – the 17th Street and London Avenue Canals. However, the Orleans Levee District and the Corps, at least to the extent the Corps had not turned over the entire project to the local sponsor, are responsible for the floodwalls that line these canals.

In the aftermath of Katrina, the New Orleans *Times-Picayune* newspaper reported that six months before Katrina, several residents near the 17th Street Canal told the Water Board that they had found water in their yards.¹¹¹ (A similar story was carried by National Public Radio.)¹¹² Following the *Times Picayune* report, the Water Board conducted an inquiry into these allegations and concluded that the water reported by these property owners was coming from a water-service line and not from the canal. This conclusion was documented in a letter from the Water Board to the *Times-Picayune* and provided to the Committee.¹¹³

The 17th Street Canal floodwall broke within several hundred feet of where the water seepage was reported. The Committee was not able to independently confirm either the news reports or the Water Board’s explanation. However, it is clear that the Water Board had no

plan in place or arrangement with either the Corps or the Orleans Levee District to address this sort of situation. The Water Board's Executive Director, Marcia St. Martin, explained how her organization dealt with such situations:

What we do is if a person says that there's water that's ponding in front of my house, we look to see whether or not a Board asset, which is the water meter, has a defect or a leak. If we determine it has a defect or a leak, we repair it. If we determine it's not coming from the Board's asset, we say to the customer, "It has to be a private property leak and you need to seek the services of a plumber."¹¹⁴

The Corps has relied on local residents to inform it about these types of problems, but had no public outreach program to urge residents to do so.¹¹⁵ When the Corps did receive reports of seepage or other issues, it had no process to formally document and address the issues.¹¹⁶ Likewise, the Orleans Levee District had no plan to reach out or communicate with residents to encourage the identification or the sharing of reports of leakage or other problems.¹¹⁷

Emergency Response

Louisiana law requires levee districts to have emergency plans. The Orleans Levee District had such a plan, but the plan did not contemplate repairing major breaches like those experienced along the 17th Street and London Avenue Canals.¹¹⁸ Instead, the levee district assumed that, consistent with the informal distinction it used in classifying O&M problems – that minor problems were its responsibility and major problems were the Corps' responsibility – fixing any breach in the system would be the Corps' responsibility because it would be "major."¹¹⁹ The Corps, meanwhile, was under the impression that the Lake Pontchartrain Project had been turned over to the levee district and so it was the levee district's responsibility to be the first responders for any emergency, regardless of the size.¹²⁰ The conflicting expectations resulted in a breakdown in the preparation for and response to Katrina among all involved – the Corps, the LA DOTD, and the Orleans Levee District.

At the Committee's December 15, 2005 hearing, "Hurricane Katrina: Who's in Charge of the New Orleans Levees?" the parties involved had no agreement on emergency responsibilities. Chairman Susan Collins asked the witnesses – Colonel Wagenaar, head of the Corps' New Orleans District; Preau, LA DOTD's Assistant Secretary for the Office of Public Works; and James Huey, former President of the Orleans Levee Board on August 29, 2005 – about their responsibilities. Chairman Collins received three different answers:

Colonel Wagenaar (Corps of Engineers): Senator, my original thought was that it was the Orleans Levee District.¹²¹

Mr. Preau (Louisiana Department of Transportation and Development): Originally, levee districts are supposed to be first responders on situations like this. If it is beyond their control, beyond their resources, then it would move up to the state level to take over. I think it was beyond the state's resources at that point. We looked towards the federal government, who had a lot more resources than we did, and who we've relied upon in the past to do major repairs. If you read the project agreements, most major repairs are to be undertaken by the Corps of Engineers on federal projects.¹²²

Mr. Huey (former President, Orleans Levee Board): First of all, it is unequivocally, I would say, the Corps of Engineers.¹²³

U.S. Army Corps of Engineers Plans and Preparations

The Corps eventually assumed responsibility on September 1 – three days after the storm – for closing the 17th Street Canal and London Avenue Canal breaches, but institutional

confusion over who was in charge and inadequate preparations delayed its taking the lead on repairs. On the morning of Katrina's landfall, August 29, as explained to the Committee, Colonel Wagenaar was under the impression that the Orleans Levee District was responsible for the Lake Pontchartrain Project and for responding to emergencies.¹²⁴ Consistent with this understanding, Colonel Wagenaar explained to the Committee that his command did not pre-position personnel to survey possible breaches or material to fill a possible breach beyond what was already available through the Corps' routine operations.¹²⁵ Moreover, the Corps did not have any standing contracts with contractors to respond to an emergency situation.¹²⁶

The Corps' New Orleans District did not suffer from a lack of available emergency plans, though it is unclear whether any were complete, ready for implementation, or followed. For example, the New Orleans District had an Emergency Operations Plan and an accompanying letter of July 2005 from Colonel Wagenaar affirming that the plan was in effect should it be needed; but, when asked whether the Corps' New Orleans District followed the Emergency Operations Plan when it responded to Katrina, he responded, "Yeah. I mean, probably was. I don't know."¹²⁷

The District had other plans as well. Versions of an "All Hazards Contingency Plan," a "Continuity of Operations Plan," a "Catastrophic Disaster Response Plan" and various versions of an unwatering plan¹²⁸ for removing floodwater from the city were all provided to the Committee in response to its document requests for any emergency plans in effect on August 23. The Corps' Emergency Manager in New Orleans explained that the Corps was considering combining the plans or perhaps shortening them. He said that the District was asking questions like, "Do we go from flood plan to hurricane plan to all hazards plan? Does it become too cumbersome? Should we have smaller plans so people actually read them? I think we were moving back to a specific hurricane plan."¹²⁹ It does not appear that any of the plans were complete, let alone followed.

In Colonel Wagenaar's defense, the Mississippi Valley Division's Hurricane Contingency Plan (Contingency Plan) contemplated a hurricane of Katrina's strength hitting the city and rendering the New Orleans District a victim, incapable of executing Corps missions or obligations under the assurance agreements for the Lake Pontchartrain Project, the National Response Plan (NRP) or the Flood Control Act.¹³⁰ The Contingency Plan called on other Corps districts within the Mississippi Valley Division like St. Louis, Vicksburg, and Memphis to carry out the New Orleans District's missions.¹³¹ For example, the Contingency Plan stated that the Corps' St. Louis District would perform civil-works missions, which include project inspections, emergency repair of damaged facilities, and any Flood Act activities.¹³² Despite the decision by Colonel Wagenaar to evacuate his personnel before landfall in accordance with the plan, there appears to have been confusion and delay in pre-positioning the resources of the other districts or reassigning the New Orleans district's responsibilities to the other districts within the Mississippi Valley Division. In fact, the commander of the Mississippi River Division did not issue the order implementing the Contingency Plan until September 3, nearly five days after the storm and two days after the Corps took control of the repair efforts along the 17th Street Canal and London Avenue Canal.¹³³

Closing the Breaches – Conflict and Confusion

With Katrina approaching, and even though the Contingency Plan provided that his district be considered a victim of the storm, Colonel Wagenaar chose to personally wait out the hurricane with a small staff in the New Orleans District's hurricane bunker. On the morning of August 29, Colonel Wagenaar said he was notified about possible breaches as early as 5 a.m.¹³⁴ Around 2 or 3 p.m., after the weather calmed, he tried to make his way to the 17th Street Canal by four-wheel drive vehicle: no helicopters were immediately available, and no

pre-storm efforts had been made to secure one.¹³⁵ Because of damage to the area, Colonel Wagenaar was only able to reach the intersection of I-10 and I-610, just north of Metairie Cemetery and just a few blocks east of the 17th Street Canal, where he was able to view the flooding first hand. He saw:

people everywhere, and then we saw the water, and the water was – all you could see were the trees sticking out of the water, so I knew that – I mean, that’s probably 10 or 15 feet of water. ... I knew we had a problem. This water had to come from somewhere. I didn’t know where, but I knew that we had a problem.¹³⁶

Throughout the previous night and the following day, Colonel Wagenaar encountered difficulties with communications. His satellite phone worked sporadically and e-mail became inoperable when the servers shut down.¹³⁷ However, Colonel Wagenaar was able to send an e-mail later Monday evening after his failed attempt to reach the 17th Street

Canal to his commander at the Mississippi Valley Division. He informed Brigadier General Robert Crear that he had seen “15+ feet of water” and that there were unofficial reports that more than 40,000 homes were underwater in East Orleans and St. Bernard Parishes.¹³⁸ Colonel Wagenaar had no dedicated communications with the Orleans Levee District, the LA DOTD or even the Coast Guard. In fact, Colonel Wagenaar was unaware that the Coast Guard was flying missions over the city on August 29 – “The first time I knew they flew over the city was when I got back [to the District office] and was watching the news [video footage of the flooding] and going, ‘Where the hell did that come from?’”¹³⁹

At about 7:15 the next morning, August 30, Colonel Wagenaar sent two members of his staff to assess the breaches.¹⁴⁰ Though the Corps believed that the levee districts would be the first responders for any breaches,¹⁴¹ Colonel Wagenaar proceeded to discuss ways to repair the floodwall breaches with the New Orleans District’s Chief of Engineering. Any plans that were discussed were hampered by not having materials, personnel, or aircraft pre-positioned to survey the damage and make repairs.¹⁴² Colonel Wagenaar was not able to carry out an air survey of the New Orleans area until late Tuesday morning.¹⁴³

Also on Tuesday and carrying over to Wednesday, LA DOTD employees surveyed the breaches and began working with the West Jefferson Levee District – a neighboring levee district, not directly impacted by the flooding, that had volunteered material and personnel to help – and whatever Orleans Levee District personnel were available to devise a way to close the breaches. They generally agreed upon a plan to dump as much broken-up concrete as possible into the holes in the floodwalls.¹⁴⁴ The Corps’ personnel who were able to make it to the scene believed it would be more efficient to drive sheet pile (long steel sheets) across the mouth of the canal itself to prevent more water from entering the canal and making its way through the breaches.¹⁴⁵ The levee districts, the LA DOTD, and the Water Board opposed closing off the canal and insisted on moving forward with their original plan, which included building a road to access the breaches to dump the concrete. Colonel Wagenaar was asked about the disagreement:

Who was doing it, who was in charge, you know, and what parish was what and who could build what road and what trucks could be used and what equipment could be used, you know. ... I mean, the issue was, is the. ... [West Jefferson] Levee District had like five trucks, dump trucks and an excavator. And here we bring in a contractor that’s ready to go that’s got 20 trucks. ... I mean, we’re bringing federal contractors – we’re bringing the federal government to bear on the problem. And they [the West Jefferson Levee District] were like, “Well, you can’t do that, that’s our road.” They were working on building this

road back there. “Well, you can’t” – you know, “We’re building the road, you can’t do that.” ... I mean, all – pretty much a turf war almost. ... And it just got to the point where, you know, we were mobilizing contractors . . . and they wouldn’t let us operate on the bridge [the Hammond Highway Bridge]. Mike Stack [with LA DOTD] and – you know, Giuseppe [with the West Jefferson Levee District] blocked some of our equipment from moving with his vehicles.¹⁴⁶

This disagreement illustrated the overall confusion among federal, state, and local entities over who was responsible for the Lake Pontchartrain Project. As mentioned above, Colonel Wagenaar thought the levee districts were responsible for the repairs,¹⁴⁷ but the Orleans Levee District did not have the personnel or the material available to address the situation. The leadership vacuum was filled by LA DOTD personnel who assumed command of the initial repair efforts.¹⁴⁸ That effort, too, proved inadequate, at least according to Colonel Wagenaar, who thought it was best that the Corps take over¹⁴⁹ – “[W]e had a bunch of dysfunctional stuff going on out there, and we figured if we didn’t do it and take over and marshal federal resources at this problem, that we’d be here for quite a while trying to fix this hole.”¹⁵⁰

The levee districts and the LA DOTD personnel on the scene did not agree with Colonel Wagenaar’s decision, so ultimately, on Thursday, September 1, LA DOTD Secretary Johnny Bradberry, and the Corps’ Director of Civil Works, Major General Don Riley, resolved the dispute, concluding that the repair effort would be a Corps-directed operation.¹⁵¹ Colonel Wagenaar explained that, in pressing for control of the repair effort, he was relying on the Corps’ authority under the Flood Act, an authority the Corps had regardless of who was in charge of the Lake Pontchartrain Project, to act independently of the assurance agreements and any action the Corps had taken to turn over the floodwalls to the Orleans Levee District for O&M.¹⁵² When General Crear issued his order implementing the Mississippi Valley Division’s Hurricane Contingency Plan on September 3, he, too, cited the Corps’ Flood Act authority as the basis to “provide critical emergency support to the people of the affected areas.”¹⁵³

Conclusion

Resolving the dispute over who was in charge of the repair effort and the full-scale efforts to fill the breaches took three days. No such dispute should have occurred, and resolution should not have taken so long. Responsibilities among the levee districts, the LA DOTD, and the Corps should have been understood and documented. An interagency emergency response plan should have been in effect. The Corps should have pre-positioned personnel and material from either the New Orleans District, or the other districts within the Mississippi Valley Division and identified in the Division’s Hurricane Contingency Plan, to assess and repair immediate problems. In the end, neither the Corps, the LA DOTD, nor the levee districts had any plan in place, nor had they determined or planned in advance who would be responsible for, and have the assets nearby, to address a major breach of the levees or floodwalls.

1 U.S. Army Corps of Engineers, Interagency Performance Evaluation Task Force, Performance Evaluation Plan and Interim Status, *Report 2 of a Series*, Mar. 10, 2006, pp. IV-1 through IV-39 [hereinafter IPET, *Report 2 of a Series*].

2 Testimony of Max Hearn, Director, Orleans Levee District, LA, before the U.S. Senate, Committee on Homeland Security and Governmental Affairs, hearing on *Hurricane Katrina: Who’s in Charge of the New Orleans Levees?*, Dec. 15, 2005.

3 U.S. Library of Congress, Congressional Research Service, *The Civil Works Program of the Army Corps of Engineers: A Primer*, by Nicole T. Carter and Betsy A. Cody, Dec. 9, 2005, p. 3 [hereinafter CRS, *The Civil Works Program*].

4 CRS, *The Civil Works Program*, p. 1.

5 Congressional direction usually comes through authorization legislation like the Water Resources Development Act, which Congress tends to consider every two years, or as part of the annual appropriations process. U.S. Library of Congress. Congressional Research Service, *Water Resources Development Act (WRDA): Army Corps of Engineers Authorization Issues in the 109th Congress*, by Nicole T. Carter. Mar. 13, 2006, p. 2.

6 Supplemental Agreement Between the United States of America and the Orleans Levee District for Local Cooperation at Lake Pontchartrain and Vicinity High Level Plan, June 21, 1985. This agreement included a common O&M provision that could be found in other assurance agreements. It stated, in part, that the Orleans Levee District was required to “[m]aintain and operate all features of the project in accord with regulations prescribed by the Secretary of the Army, including levees, floodgates and approach channels, drainage structures, drainage ditches, or canals, floodwalls, and stoplog structures.”

7 U.S. Army Corps of Engineers, New Orleans District, “Mississippi Valley Division Work Flood Control Act Project Maps,” last updated on June 10, 1998. http://www.mvn.usace.army.mil/eng2/edsd/proj_maps/pmap_fcp2.htm. Accessed on Apr. 11, 2006.

8 U.S. Army Corps of Engineers, New Orleans District, “Who We Are.” <http://www.mvn.usace.mil/pao/whoweare/index/asp>. Accessed on Apr. 21, 2006.

9 Committee staff interview of Col. Richard Wagenaar, District Commander, New Orleans District, U.S. Army Corps of Engineers, conducted on Nov. 15, 2005, transcript p. 16.

10 A common provision in the assurance agreements for the Lake Pontchartrain Project required the Orleans Levee District to “[m]aintain and operate all features of the project in accordance with regulations prescribed by the Secretary of the Army, including levees, floodgates and approach channels.” Various Assurance Agreements for Lake Pontchartrain and Vicinity Protection Project, dates vary. Provided to Committee; Written Statement of Anu K. Mittal, Director, Natural Resources and Environment, Government Accountability Office, for the U.S. Senate, Committee on Homeland Security and Governmental Affairs, hearing on *Hurricane Katrina: Who’s in Charge of the New Orleans Levees?*, Dec. 15, 2005, pp. 1-2.

11 33 C.F.R. § 208.10.

12 Committee staff interview of Jerry Colletti, U.S. Army, Operations Manager for Completed Works, New Orleans District, U.S. Army Corps of Engineers, conducted on Nov. 22, 2005, transcript, pp. 19-27.

13 33 U.S.C. § 701n.

14 Col. Wagenaar interview, Nov. 15, 2005, pp. 114-115; U.S. Army Corps of Engineers, Mississippi Valley Division, Operations Order 01-05 (Hurricane Katrina), *MVD Hurricane Contingency Plan 18 May 2005*, Sept. 3, 2005. Provided to Committee [hereinafter, Mississippi Valley Division, Operations Order 01-05, Sept. 3, 2005].

15 Edmond J. Preau, Jr., Association of Levee Boards of Louisiana, “The History and Function of Louisiana’s Levee Boards,” PowerPoint presentation. <http://www.albl.org/workshops.php>. Accessed on Mar. 22, 2005.

16 La. R.S. 38:306.

17 La. R.S. 38:306 (B).

18 La. R.S. 38:306 (B) and (C).

19 La. R.S. 38:301 (B).

20 La. Const. Art. VI, § 39; La. Const. Art. VI, § 41; La. R.S. 38:307; La. R.S. 38:335.

21 La. R.S. 38:306 (B). As of June 2005, there were estimates that the casino lease generated about 20 percent of the Orleans Levee District’s revenue. Orleans Levee District, Basic Financial Statement, June 30, 2005, p. ix; Committee staff interview of Steven Spencer, U.S. Army, Chief Engineer, Orleans Levee District, U. S. Army Corps of Engineers, conducted on Nov. 14, 2005, transcript pp. 123-124.

22 Orleans Levee District, Basic Financial Statements, June 30, 2005, p. 14. Provided to Committee.

23 Orleans Levee District, Basic Financial Statements, June 30, 2005, p. 16. Provided to Committee.

24 Committee staff interview of James Huey, former President, Orleans Levee Board, LA, conducted on Nov. 29, 2005, transcript p. 19.

25 Orleans Levee District, Basic Financial Statements, June 30, 2005, p. 14. *See also:* Testimony of James Huey, former President, Orleans Levee Board, LA, before the U.S. Senate, Committee on Homeland Security and Governmental Affairs, hearing on *Hurricane Katrina: Who’s in Charge of the New Orleans Levees?*, Dec. 15, 2005 (“[Senator Collins:] ... And, in fact, when we reviewed the minutes of the board’s meetings, we found that a majority of the meeting time was actually spent discussing these commercial enterprises, whether it was the licensing of the casino or the operations of the airport or the marinas or the commercial leases with the karate business and the beauty shop and the restaurants. Do you think it is appropriate for the board to be involved in these commercial activities? Do those business activities detract time and attention from what is truly the mission of the board, which is to ensure the safety, the maintenance, the operations of the levees?” “[Mr. Huey:] Yes and no.”).

26 Spencer interview, Nov. 14, 2005, pp. 66-67; Committee staff interview of Max Hearn, Executive Director, Orleans Levee District, LA, conducted Nov. 14, 2005, transcript pp. 59-60.

27 Hearn interview, Nov. 14, 2005, pp. 59-60.

28 Spencer interview, Nov. 14, 2005, p. 67.

- 29 Spencer interview, Nov. 14, 2005, p. 67.
- 30 Money for the fountain came from the levee district's capital projects fund which was supported by funding from property taxes. Frank Donze, "Lakeside Legacy Lives," *New Orleans Times-Picayune*, July 12, 2004, Metro, p. 1.
- 31 Hearn interview, Nov. 14, 2005, pp. 31-32.
- 32 Orleans Levee District, Minutes of Joint Finance and Planning, Engineering and Construction Committee Meeting, July 5, 2005, p. 2. Provided to Committee [hereinafter Orleans Levee District, Minutes of Committee Meeting, July 5, 2005].
- 33 Orleans Levee District, Minutes of Committee Meeting, July 5, 2005, p. 2.
- 34 Hearn, Senate Committee hearing, Dec. 15, 2005.
- 35 Orleans Levee District, Minutes of Committee Meeting, July 5, 2005, p. 2.
- 36 Huey interview, Nov. 29, 2005, pp. 30-33.
- 37 La. R.S. 38:306.
- 38 La. R.S. 38:213; Committee staff interview of Edmund Preau, Assistant Secretary, Public Works and Inter-Modal Transportation, Louisiana Department of Transportation and Development, conducted on Nov. 17, 2005, transcript p. 38.
- 39 La. R.S. 38:301(B).
- 40 Huey interview, Nov. 29 2005, pp. 100-105; Association of Levee Boards of Louisiana, "About ALBL." http://www.albl.org/about_us.php. Accessed on Mar. 22, 2006.
- 41 Huey interview, Nov. 29, 2005, p. 101.
- 42 Huey interview, Nov. 29, 2005, p. 104.
- 43 Huey interview, Nov. 29, 2005, p. 105; Hearn interview, Nov. 14, 2005, pp. 44-45.
- 44 La. R.S. 38:319.
- 45 Preau interview, Nov. 17, 2005, pp. 41-42.
- 46 Preau interview, Nov. 17, 2005, pp. 41-42.
- 47 Preau interview, Nov. 17, 2005, pp. 44-45.
- 48 Louisiana Office of Homeland Security and Emergency Preparedness, *Emergency Operations Plan*, Apr. 2005, p. ESF-3-1 [hereinafter *Louisiana Emergency Operations Plan*, Apr. 2005].
- 49 *Louisiana Emergency Operations Plan*, Apr. 2005, p. ESF-3-2.
- 50 *Louisiana Emergency Operations Plan*, Apr. 2005, p. ESF-3-2.
- 51 Preau interview, Nov. 17, 2005, pp. 91-92.
- 52 Written Statement of Mittal, Senate Committee on Environment and Public Works hearing, Nov. 9, 2005, p. 2.
- 53 Written Statement of Mittal, Senate Committee on Environment and Public Works hearing, Nov. 9, 2005, "What GAO Found," and pp. 1-2.
- 54 Written Statement of Mittal, Senate Committee on Environment and Public Works hearing, Nov. 9, 2005, p. 4.
- 55 IPET, *Report 2 of a Series*, p. IV-13.
- 56 Though the level of protection that the Lake Pontchartrain Project was supposed to provide did not change once it was underway, the plan for building the project did. The initial design authorized in 1965 followed what was called the "Barrier Plan." This plan called for the construction of a barrier on the eastern edge of Lake Pontchartrain for the purpose of preventing storm surges from entering Lake Pontchartrain. This would have lowered the threat of storm surges rising in the lake and threatening the lake front levees and the communities they protected. However, in 1977, a federal district court issued a ruling enjoining the Corps from pursuing the Barrier Plan until the Corps addressed problems with the project's environmental impact statement. *Source*: Written Statement of Mittal, Senate Committee on Environment and Public Works hearing, Nov. 9, 2005, pp. 1-9.
- In 1984, the Corps commissioned a reevaluation study to analyze the continued feasibility of the Barrier Plan and whether the Corps should opt for an alternative design called the "High-Level Plan." The High-Level Plan, which had been considered in 1965 and rejected, called for raising and strengthening the levees and floodwalls that would be affected by a storm surge from Lake Pontchartrain rather than building the barrier. The reevaluation study concluded that the High-Level Plan was more feasible and served as the impetus for changing the design of the project. *Source*: Written Statement of Mittal, Senate Committee hearing, Nov. 9, 2005, pp. 1-9.
- During Katrina, there were several breaches along levees and floodwalls constructed as part of the High-Level Plan. In the aftermath of Katrina, there has been debate as to whether the Barrier Plan would have been more effective in fending off the storm surge. The position of the Corps of Engineers is that plans would have provided the same level of protection because they both would have been designed to the same standard – the Standard Project Hurricane – and would not have materially altered the outcome. As explained in recent Senate testimony by Daniel Hitchings, an official with the Mississippi Valley Division of the Corps:

I would also like to correct one statement that was made earlier, I believe was related to the previously

proposed Barrier Plan, in that it would not have made any difference. That statement I believe is accurate, but it is accurate not because it was an inadequate plan, and not because the storms would have gone up the MRGO [Mississippi River – Gulf Outlet – a shipping channel that connects to the Gulf of Mexico] anyway. It would not have made a difference because its authorized level was still the standard project hurricane.

Source: Testimony of Daniel Hitchings, Director, Task Force HOPE, U.S. Army Corps of Engineers, before the U.S. Senate, Committee on Environment and Public Works, hearing to “Evaluate the Degree to Which the Preliminary Findings on the Failure of the Levees are Being Incorporated Into the Restoration of Hurricane Protection,” Nov. 17, 2005.

57 Lt. Gen. Carl Strock, Commander, U.S. Army Corps of Engineers, “Defense Department Special Briefing on Efforts to Mitigate Infrastructure Damage from Hurricane Katrina,” press briefing, Sept. 2, 2005.

58 U.S. Army Corps of Engineers, New Orleans District, Project Fact Sheet, “Lake Pontchartrain, LA. and Vicinity Hurricane Protection Project, St. Bernard, Orleans, Jefferson, and St. Charles Parishes, LA.” Last updated on May, 23, 2005. <http://www.mvn.usace.army.mil/pao/response/HURPROJ.asp?prj=lkpon1>. Accessed on Apr. 11, 2006.

59 Committee staff interview of Alfred Naomi, Senior Project Manager, Lake Pontchartrain and Vicinity Hurricane Protection Project, New Orleans District, U.S. Army Corps of Engineers, conducted on Nov. 16, 2005, transcript pp. 50-51.

60 Army Corps of Engineers, New Orleans District, “N.O. hurricane bridge contract awarded, Corps, Levee Board will floodproof two bridges in Gentilly,” news release, Dec. 19, 2001.

61 Army Corps of Engineers, New Orleans District, “Cross Bayou Drainage Structure to reduce flooding in St. Charles Parish,” news release, May 27, 2003.

62 Army Corps of Engineers, New Orleans District, “Filmore Bridge in Gentilly will reopen on Friday, Aug. 22. Mirabeau Bridge is closing Wednesday, Aug. 27 for hurricane floodproofing,” news release, Aug. 21, 2003.

63 Col. Wagenaar interview, Nov. 15, 2005, p. 94 (“But, I mean, I knew that the city – I’d been briefed, you know, hurricane protection-wise, that generally the city could take a fast-moving Category 3, and anything else could be catastrophic. I mean, I was told that.”).

64 Committee staff interview of Michael Lowe, Emergency Manager, New Orleans District, U.S. Army Corps of Engineers, conducted on Nov. 16, 2005, transcript p. 74 (“My understanding of the level of protection in the New Orleans area is a fast moving Category 3 hurricane on the Saffir-Simpson Scale. How I came about saying that, or my understanding of that, is mainly what I hear from the project manager who is deal – working on the hurricane systems.”). See also: Lowe interview, Nov. 16, 2005, pp. 73-77, 81.

65 U.S. Army Corps of Engineers, New Orleans District, Un-Watering Plan, Greater Metropolitan Area, New Orleans, Louisiana, Aug. 18, 2000, p. 3. See also: U.S. Army Corps of Engineers, Hurricane Protection, Louisiana, June 28, 2002, p. 9.

66 Colletti interview, Nov. 22, 2005, transcript p. 22.

67 Committee staff interview of Wilson Shaffer, Ph.D., Chief, Evaluations Branch, National Weather Service, conducted on Feb. 24, 2005, transcript pp. 38-41.

68 Shaffer interview, Feb. 24, 2006, pp. 37, 61-67.

69 Written Statement of Roy K. Dokka, Ph.D., Director, Louisiana Spatial Reference Center and Center for Geoinformatics, Louisiana State University, for the U.S. House of Representatives, Committee on Transportation and Infrastructure, Subcommittee on Water Resources and Environment, hearing on Expert Views on Hurricane and Flood Protection and Water Resources Planning for a Rebuilt Gulf Coast, Oct. 20, 2005, pp. 2-6.

70 IPET, Report 2 of a Series, p. I-2

71 Mittal, Senate Committee hearing, Dec. 15, 2005; Naomi interview, Nov. 16, 2005, pp. 18-21.

72 33 C.F.R. § 208.10(a)(1).

73 33 C.F.R. § 208.10.

74 Naomi interview, Nov. 16, 2005, pp. 19-20. Mr. Hearn agreed that the Lake Pontchartrain Project had not been formally turned over to the Orleans Levee District. Hearn interview, Nov. 14, 2005, p. 76.

75 Colletti interview, Nov. 22, 2005, pp. 11-16.

76 Colletti interview, Nov. 22, 2005, pp. 11-16.

77 Colletti interview, Nov. 22, 2005, pp. 16-17.

78 Colletti interview, Nov. 22, 2005, p. 17.

79 In preparation for the Committee’s December 15 hearing on the levee system, the Committee asked GAO to investigate whether parts or all of the Lake Pontchartrain Project had been turned over. The GAO report stated that, according to the Corps and the task force charged with rebuilding the levee system – Task Force Guardian, all but three sections of the Lake Pontchartrain Project in New Orleans had been turned over to the Orleans Levee District. The criteria used by the Corps and Task Force Guardian to make this determination were: (1) if the project unit was at its design height; (2) whether portions of the project was being operated and maintained by the Orleans Levee District; and (3) if the portion of the project had passed the annual inspection for completed works in accordance with Corps regulations. Neither the Corps nor Task Force Guardian relied on the turnover letters to make their determinations. Moreover, the assessment by the Corps and Task Force Guardian as to whether the Orleans Levee District was conducting daily O&M ignored the

fact that the levee district had obligations to look after flood control projects under state law separate and apart from the its role as a local sponsor under the assurance agreements. Source: Written Statement of Mittal, Senate Committee hearing, Dec. 15, 2005. Moreover, reliance on whether a part of the project passed the annual inspection is a canard. As discussed in more detail below, the Corps gave the Orleans Levee District passing grades for the annual inspections even though the inspections did not involve geotechnical studies assessing the strength of the system, analyses of whether the project was at its design height, or even stopping at the floodwalls along the 17th Street and London Avenue Canals because they were inaccessible by car, the mode of transportation generally used for the annual inspections. Moreover, the passing grades were given even though there were known vulnerabilities in direct contravention of the Corps' rules and regulations: vegetation was growing along the floodwalls, a railroad gate near the Inter Harbor Navigation Canal remained broken for more than a year, and there was a levee well below its design height in New Orleans East.

80 33 C.F.R. § 208.10(a)(6).

81 Colletti interview, Nov. 22, 2005, pp. 50-53.

82 33 C.F.R. § 208.10(a)(10).

83 Colletti interview, Nov. 22, 2005, p. 68.

84 Spencer interview, Nov. 17, 2005, pp. 10-12.

85 Hearn interview, Nov. 14, 2005, p. 43.

86 Spencer interview, Nov. 17, 2005, pp. 10-12.

87 Colletti interview, Nov. 22, 2005, pp. 20-28.

88 Huey interview, Nov. 29, 2005, pp. 108-109.

89 Orleans Levee District, Minutes of Joint Finance and Planning, Engineering and Construction Committee Meeting, Apr. 5, 2005, p. 6. Provided to Committee [hereinafter Orleans Levee District, Minutes of Committee Meeting, Apr. 5, 2005].

90 Huey interview, Nov. 29, 2005, p. 58.

91 Orleans Levee District, Minutes of Committee Meeting, Apr. 5, 2005, p. 6.

92 La. R.S. 38:2211.

93 Huey interview, Nov. 28, 2005, pp. 64-65.

94 Orleans Levee District, Minutes of Committee Meeting, Mar. 5, 2005, p. 7.

95 33 C.F.R. § 208.10(a)(8).

96 33 C.F.R. § 208.10(c)(1)(iii).

97 U.S. House, Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, *A Failure of Initiative*, Washington: Government Printing Office, 2006, p. 92. *See also*: Ann Carrns, "Long Before Flood, New Orleans System was Prime for Leaks," *The Wall Street Journal*, Nov. 25, 2005, p. A1.

98 Orleans Levee Board, Minutes of Joint Finance and Planning, Engineering and Construction Committee, May 31, 2005, p. 6. Provided to Committee.

99 Colletti interview, Nov. 22, 2005, pp. 82-83; Hearn interview, Nov. 14, 2005, p. 48; Huey interview, Nov. 29, 2005, p. 107.

100 Colletti interview, Nov. 22, 2005, pp. 40-43.

101 Hearn interview, Nov. 14, 2005, pp. 45-48.

102 Hearn interview, Dec. 8, 2005, pp. 3-8.

103 Hearn interview, Nov. 14, 2005, pp. 11-12.

104 Spencer interview, Nov. 14, 2005, p. 45.

105 Hearn, Senate Committee hearing, Dec. 15, 2005.

106 Hearn, Senate Committee hearing, Dec. 15, 2005. *See also*: IPET, *Report 2 of a Series*, pp. I-2, III-6, III-26 through III-29, III-32 through III-40.

107 Testimony of Jerry Colletti, Manager for Completed Works, New Orleans District, U.S. Army Corps of Engineers, before the U.S. Senate, Committee on Homeland Security and Governmental Affairs, hearing on *Hurricane Katrina: Who's in Charge of the New Orleans Levees?*, Dec. 15, 2005.

108 Ernst G. Frankel, letter to the Honorable Senator Susan Collins, Dec. 14, 2005.

109 Committee staff interview of Jerry Colletti, Manager for Completed Works, New Orleans District, U.S. Army Corps of Engineers, conducted on Dec. 9, 2005, transcript p. 20.

110 Hearn, Senate Committee hearing, Dec. 15, 2005.

111 Bob Marshall, "Levee leaks reported to S&WB a year ago; Lakeview residents' complaints fell between the cracks," *New Orleans Times-Picayune*, Nov. 18, 2005, National, p. 1.

- 112 Frank Langfitt, "Residents Say Levee Leaked Months Before Katrina," National Public Radio, Nov. 22, 2005. <http://www.npr.org/templates/story/story.php?storyId=5022074>. Accessed on Apr. 10, 2006.
- 113 Marcia A. St. Martin, letter to the editor, *New Orleans Times-Picayune*, Dec. 5, 2005. Provided to Committee.
- 114 Committee staff interview of Marcia A. St. Martin, Executive Director, New Orleans Sewerage and Water Board, conducted on, Dec. 9, 2005, transcript p. 32.
- 115 Colletti interview, Nov. 22, 2005, pp. 59-60.
- 116 Colletti interview, Nov. 22, 2005, pp. 56-57.
- 117 Huey interview, Nov. 28, 2005, pp. 118-119.
- 118 Hearn interview, Nov. 14, 2005, pp. 54-55.
- 119 Spencer interview, Nov. 14, 2005, p. 56.
- 120 Testimony of Col. Richard Wagenaar, Chief Engineer, New Orleans District, Army Corps of Engineers, before the U.S. Senate, Committee on Homeland Security and Governmental Affairs, hearing on *Hurricane Katrina: Who's in Charge of the New Orleans Levees?*, Dec. 15, 2005.
- 121 Col. Wagenaar, Senate Committee hearing, Dec. 15, 2005.
- 122 Testimony of Edmond Preau, Assistant Secretary, Public Works and Intermodal Transportation, Louisiana Department of Transportation and Development, before the U.S. Senate, Committee on Homeland Security and Governmental Affairs, hearing on *Hurricane Katrina: Who's in Charge of the New Orleans Levees?*, Dec. 15, 2005.
- 123 Huey, Senate Committee hearing, Dec. 15, 2005.
- 124 Col. Wagenaar, Senate Committee hearing, Dec. 15, 2005.
- 125 Col. Wagenaar interview, Nov. 15, 2005 pp. 77-78; Lowe interview, Nov. 16, 2005, pp. 18-19.
- 126 Lowe interview, Nov. 16, 2005, p. 90.
- 127 Col. Wagenaar interview, Nov. 15, 2005, pp. 14-15.
- 128 Col. Richard P. Wagenaar, memorandum on the New Orleans District, Emergency Operations Plan, July, 2005; U.S. Army Corps of Engineers, *New Orleans District, All Hazards Contingency Plan*, August, 2005; U.S. Army Corps of Engineers, New Orleans District, *Continuity of Operations Plan* (Redacted); U.S. Army Corps of Engineers, New Orleans District, *Catastrophic Disaster Response Plan*. Since 2000, the New Orleans District has recognized that New Orleans would sustain extensive flooding in a major hurricane and has had a plan, known as the Un-watering Plan, to evacuate water from the city and surrounding parishes in such an event. U.S. Army Corps of Engineers, New Orleans District, *Un-Watering Plan, Greater Metropolitan Area, New Orleans, Louisiana*, Aug. 18, 2000.
- 129 Lowe interview, Nov. 16, 2005, p. 29.
- 130 U.S. Army Corps of Engineers, Mississippi Valley Division, *Hurricane Contingency Plan (CONPLAN)*, May 18, 2005, p. 1. Provided to Committee [hereinafter Mississippi Valley Division, *CONPLAN*].
- 131 Mississippi Valley Division, *CONPLAN*, pp. 3-4.
- 132 Mississippi Valley Division, *CONPLAN*, p. 4.
- 133 Mississippi Valley Division, Operations Order 01-05, Sept. 3, 2005.
- 134 Col. Wagenaar interview, Nov. 15, 2005, p. 52.
- 135 Col. Wagenaar interview, Nov. 15, 2005, pp. 54, 61-63.
- 136 Col. Wagenaar interview, Nov. 15, 2005, p. 57.
- 137 Col. Wagenaar interview, Nov. 15, 2005, p. 28.
- 138 Col. Richard P. Wagenaar, e-mail to Robert Crear, SITREP:29 August 2005, Aug. 29, 2005, 7:49 p.m. Provided to Committee.
- 139 Col. Wagenaar interview, Nov. 15, 2005, p. 69.
- 140 Col. Wagenaar interview, Nov. 15, 2005, pp. 62-63.
- 141 Col. Wagenaar interview, Nov. 15, 2005, p. 113; Lowe interview, Nov. 16, 2005, p. 5.
- 142 Col. Wagenaar interview, Nov. 15, 2005, pp. 77, 80-81.
- 143 Col. Wagenaar interview, Nov. 15, 2005, pp. 62-65.
- 144 Committee staff interview of Michael J. Stack, Engineer, New Orleans District Design Water Resources, Louisiana Department of Transportation and Development, conducted on Nov. 17, 2005; Hearn interview, Nov. 14, 2005, pp. 71-73.
- 145 Committee staff interview of Kenneth Crumholt, Resident Engineer, Construction Division, West Bank Hurricane Protection Project, New Orleans District, U.S. Army Corps of Engineers and Richard Pinner, Section Chief, Geotech Branch, Engineering Division, New Orleans District, U.S. Army Corps of Engineers, conducted on Nov. 16, 2005, transcript pp. 23-24.
- 146 Col. Wagenaar interview, Nov. 15, 2005, pp. 105-107. *See also:* Col. Wagenaar interview, Nov. 15, 2005, pp. 122-123

("I mean, so – I mean, just all these data points, and I'm relatively – I'm new, I mean, I don't – I mean, this whole Levee District/Sewer and Water Board concept was relatively new to me. But just these data points of: Who is in charge? I mean, where's the Parish President? Where is the Mayor? And then the State, 'Well they work for DOTD.' I'm like, 'Okay. Who is in charge?' That was my view. I still have that view. I mean, so at some point, I mean -- you know, there is an old local – there is an old saying in the Army: When in charge, take charge. And I know I was in charge of the Corps of Engineers, the district, so I mean, at some point, you know, you've got to make stuff happen. Because this was a bad situation.").

147 Col. Wagenaar interview, Nov. 15, 2005, pp. 111-113 ("I knew the levee districts were in charge, it was their project, that they had the responsibility to do the repair. ... It's just a general operating principle here. I mean, we don't have O&M of these projects once we turn them over. ... But no, I knew it was their job to fix these originally. We tended to want to let it go that way until – I mean, until it was obvious that it needed federal involvement.").

148 Hearn interview, Nov. 14, 2005, pp. 71-73.

149 Col. Wagenaar interview, Nov. 15, 2005, pp. 111-113.

150 Col. Wagenaar interview, Nov. 15, 2005, pp. 104-105.

151 Col. Wagenaar interview, Nov. 15, 2005, pp. 104-108.

152 Col. Wagenaar interview, Nov. 15, 2005, p. 114.

153 Mississippi Valley Division, Operations Order 01-05, Sept. 3, 2005.