



REPORT CARD FOR
LOUISIANA
INFRASTRUCTURE

2017



Louisiana Section of the American Society of Civil Engineers
INFRASTRUCTUREREPORTCARD.ORG/LOUISIANA



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

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AVIATION
C



BRIDGES
D+



COASTAL
D+



DAMS
C+



DRINKING
WATER
D-



INLAND
WATERWAYS
D-



LEVEES
C



PORTS
C-



ROADS
D



SOLID WASTE
C+



WASTE WATER
C-





OUR GOAL

The Louisiana Section of the American Society of Civil Engineers (ASCE) represents over 2,000 civil engineers who plan, design, operate and maintain Louisiana's infrastructure. As civil engineers, "We are entrusted to maintain and modernize America's deteriorating infrastructure." The primary mission of ASCE, both local and national, is to serve the public good. Strategic initiatives to address positive change are defined at the national level as:

- **Sustainable Infrastructure** – Maintaining and modernizing America's deteriorating infrastructure as well as making our communities sustainable
- **ASCE Grand Challenge** – Significantly enhancing the performance and value of infrastructure projects over their life cycles by 2025 and optimizing investments
- **Raise the Bar** – Increasing education requirements for engineering licensure to better protect the public in the future

This 2017 Report Card was prepared by a committee of select civil engineers who are experts in various types of public works. We hope this publication will raise awareness of the infrastructure needs in the State of Louisiana both at a state and local level. The intent of this 2017 Report Card is that our legislators, governing agencies, and the public understand the state of the infrastructure that our citizens depend upon.



OUR RESULTS

In 2012, Louisiana Section of American Society of Civil Engineers' (ASCE) very first *Report Card for Louisiana's Infrastructure* started with the following statement:

Louisiana's infrastructure needs immediate attention.

Today, over five years later, this overarching conclusion remains more valid than ever.

Again, an expert team of more than 50 civil engineers were assembled to evaluate and study 11 major components of Louisiana's infrastructure for more than 18 months. Their results have been reviewed not only by independent experts locally, but they also have been scrutinized by ASCE's team of national experts.

The conclusion is not a surprise but more an alarm that over the course of the last five years, the system has detreated further. Our infrastructure is poorly maintained, inadequately funded, and not designed to meet tomorrow's demands. Consequently, **the state is at a disadvantage and will continue to lose its economic competitiveness.**

As civil engineers, we understand the intricate details of infrastructure. We plan, design, build, maintain and operate roads and bridges, dams and levees, and we provide the public with safe and clean drinking water. With that responsibility, we also carry an obligation to tell the public the truth. **The truth is that our infrastructure is in poor shape and needs immediate attention.**

We present this report card as a fulfillment of our public duty as designers and builders of public facilities. Our infrastructure is of vital importance to all; it sustains our quality of life, keeps us safe and healthy, allows us to be mobile, and provides the framework for our global economy to function. We depend daily on our infrastructure, yet we take its condition for granted until a failure produces tragic results, such as a levee failure or a bridge collapse. **We produced this report card to inform the public and our elected officials about the status of the state's infrastructure. We are not proud of our grades.**

The national ASCE first reported on the state of the nation's infrastructure in 1995. Its 2017 edition was published in March and gave the nation's infrastructure an average grade of "D." A great deal of time and resources were dedicated to produce Louisiana's latest report card. **Our statewide average grade is "D+."**

Our hope is that the public will demand action from our political leaders who ultimately have the control over how much and where the revenues are to be invested. We hope for a positive response from our elected leaders by taking action to prioritize and provide necessary funding and demand accountability from responsible public officials in delivering results that will improve our infrastructure and secure a better future for Louisiana's citizens.

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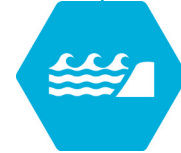


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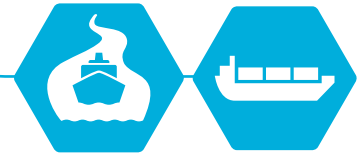


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WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S AIRPORTS

The DOTD aviation system is a significant contributor to the statewide economy. It produces a direct economic output of \$6.7 billion and helps sustain 58,853 jobs. Funding for aviation projects in Louisiana originates from federal, state, local or private sources. The total 2016-2017 funding program for Louisiana's airports represents an approximate 6.5% increase in funding over Fiscal Years 2014-2015 and 2015-2016; however, this increase still does not keep up with the corresponding increase in future needs.

The Federal Aviation Administration (FAA) is currently operating under an extension to its reauthorization legislation that provides funding at current levels through September 2017. The absence of a multi-year funding source is prohibiting airports from implementing phased development plans because the short-term nature of each funding bill extension cannot be applied to the long-term nature of most project planning and construction efforts.

CONDITION AND MANAGEMENT

Capacity ↔ Same from 2012

Louisiana has 63 publicly owned and public use general aviation airports and seven air carrier commercial airports that fall under guidance of the Louisiana Department of Transportation and Development's Aviation section (DOTD). Within these 70 state managed airports, 56 are considered significant to national air transportation, and they are identified within the National Plan of Integrated Airport Systems (NPIAS). These 56 NPIAS airports are eligible to receive grants under the Federal Aviation Administration (FAA) Airport Improvement Program (AIP). Louisiana's airports currently have adequate capacity to accommodate current levels of operations.

The City of New Orleans has begun construction of a new terminal building at Louis Armstrong Airport (MSY). This project will actually decrease the number of operating gates from 36 to 35. However, gates at the new terminal will accommodate newer wide body aircrafts, which will have room for more passengers who intend to fly to international destinations, such as London, England and Frankfurt, Germany via British Airways and Condor Airlines, respectively. If the current levels of growth continue, the new terminal will also be designed to accommodate an expansion of up to 42 gates.



Condition ↔ Same from 2012

Louisiana's airport pavement conditions are assessed based upon standard pavement condition index assessments. Of the hard-surfaced runways that make up the Louisiana system of airport pavements, 78% were rated as good, very good, or excellent condition. This can be further broken down into General Aviation Airports (GA) and Air Carrier Airports. 88% of pavements on Air Carrier Airports were rated as good or better condition, while 75% of pavements on GA Airports' were rated as good or better condition.

Operations & Maintenance ↔ Same from 2012

Airport runways, taxiways, hangars, and terminals all require routine regular maintenance. Continued maintenance of an airport's runway system is of particular importance. Regularly conducted PCI studies for pavement assessment purposes assist airports in appropriately directing the right repair methods to the right pavements at the right time. DOTD is in the process of completing a comprehensive PCI study for its airport runways. This is critical to proper O&M of airport facilities.

Public Safety ↓ Down from 2012

Runway incursions are a top FAA safety concern that involves pilots, air traffic control, and ground operations. These parties work together to ensure that airport operations are providing the travelling public with a safe area of operation (AOA). A runway incursion is defined as any occurrence at an airport involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the arrival and departure of an aircraft. According to the latest available incursion data from FAA Fiscal Year 2013-2014, Louisiana air carrier airports saw a 45% decrease in the number of incursions over the previous reporting period. However, this decrease follows two years with the highest number incursions seen over recent reporting periods. Overall incursion numbers, when compared to the available reporting periods discussed during the 2012 Report Card for Louisiana's Infrastructure, are up from 15 to 22. Louisiana's airports could benefit from seeing a steady and consistent reduction in runway incursion numbers.

FUNDING AND FUTURE NEEDS

Funding ↔ Same as 2012

The DOTD Aviation section is responsible for administering state, local, and other funds through the Louisiana Airport Construction and Development Priority Program. This funding program sets project priorities and assigns state and local funds to each of the priority projects. These funds are often used as the local match for federal funds provided to Louisiana's airports via the FAA Airport Improvement Projects (AIP) program. The Louisiana Airport Construction and Development Priority Program for Fiscal Year 2016-2017, in conjunction with the FAA AIP, has committed approximately \$103 million in federal, state and local funds for aviation projects taking place at Louisiana's air carrier and general aviation airports. Of the approximate \$103 million, \$71.7 million came from federal funds, \$26.5 million came from state funds, and \$4.6 million came from local/other funds.

In 1989, there was an addition to the Louisiana Constitution that created the Aviation Trust Fund (ATF). The ATF helped the State to become a major source of funding for Louisiana's airports. The Local/Other funds consist of mainly Passenger Facility Charges (PFC).



Louisiana's total funding program for 2016-2017 represents an approximate 6.5% increase from funds distributed in Fiscal Years 2014-2015 and 2015-2016. Though it represents an increase, this \$6.4 million growth has not kept pace with the increase in backlog that has also occurred over the same time period. \$1.105 billion in unfunded projects for the 2016-2019 are included in the Louisiana Supplemental Aviation Priority Program.

A combination of city-issued bonds, federal grant funds, state funds, and also passenger facility charges are funding the new terminal at Louis Armstrong Airport. The airlines operating out of MSY are in large part responsible for paying off the bond issue. Airlines guarantee the airport that it will operate at a revenue neutral level. They cover any operating expenses that are not stemming from airport generated revenues.

The three primary items affecting the grading of aviation funding in this report card are the lack of a long-term FAA authorization bills, the \$1.105 billion in unfunded projects for the 2016-2019 Louisiana Supplemental Aviation Priority Program, and the fact that the Aviation Transportation Fund (ATF) is funded based on a percentage of aviation fuel costs.

Substantive changes in airport related funding have not been realized since the 2012 Report Card for Louisiana's Infrastructure was published. While the overall budget for Louisiana airport funding has increased by \$6.4 million over the previous year's program, the amount is not sufficient enough to match the increase in the four-year backlog of airport related projects.

Future Needs ↓ Down from 2102

The Louisiana Aviation Priority Program for Fiscal Year 2016-2017 contains a \$1.105 billion backlog of projects that are included in the 2016-2019 Louisiana Supplemental Aviation Priority Program. This backlog has increased by approximately \$25 million and additional funding streams have not yet been identified since the previous report card was published. The construction of the new terminal building at Louis Armstrong Airport has been designed to accommodate an expansion from 36 to 42 gates should future needs require additional capacity.

Resilience ↔ Same as 2012

The ability of Louisiana's airports to operate efficiently during substandard conditions or during periods of crisis can greatly impact the government's ability to react and recover from the overall dilemma. Generators are critical to restoring power to airport facilities, allowing operations to continue through power outages. The availability of generators has remained steady at 74% of the airports supported by DOTD.

Innovation ↑ Up from 2012

NextGen is an all-encompassing FAA program with the goal of making airspace more safe and efficient. At its core, NextGen plans to transition from a ground based air traffic control system to a satellite based system. There are numerous technological initiatives within the NextGen program that aim to improve airspace safety and efficiencies. DOTD has been discussing the impact of NextGen on its airports since its inception.



AVIATION



LET'S RAISE THE GRADE

With \$1.105 billion in unfunded projects on backlog, current funding levels are not sufficient to maintain existing facilities throughout the state while continuing to address capital improvement projects. Other potential funding sources should be investigated. Passenger Facility Charges should be used in a cost-effective manner with the goal of addressing high priority projects, and the contribution of the Aviation Trust Fund should be assessed on a regular basis with fuel costs continuing to dramatically increase.

Louisiana should further emphasize the idea of consistently reducing the number of incursions reported at its airports in order to enhance public safety.

FIND OUT MORE

The following Sources were utilized in developing this report:

- https://www.faa.gov/airports/planning_capacity/npas/reports/
- 2016 Louisiana Engineering Conference PowerPoint presentation
http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Aviation/Pages/Construction_Development.aspx
- National Runway Safety Report, https://www.faa.gov/airports/runway_safety/publications/media/Runway-Safety-Report-2013-14.pdf



WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S BRIDGES

With 12,915 bridges and 16,387,706 square feet of bridge deck, Louisiana ranks 4th in total bridge area; however, it ranks 25th when it comes to population. Unlike other states, Louisianans rely on bridges to connect between numerous bayous, canals, and waterways. In fact, Louisiana is home to 5 of the 8 longest highway bridges in the world. 13.5% of bridges in Louisiana are structurally deficient, which means they have been rated as being in poor condition due to structural flaws that affect the load carrying capacities or the waterways that frequently overtop the bridges during floods. Louisiana ranks 2nd in the nation in number of structurally deficient bridges based on square footage of bridge deck.

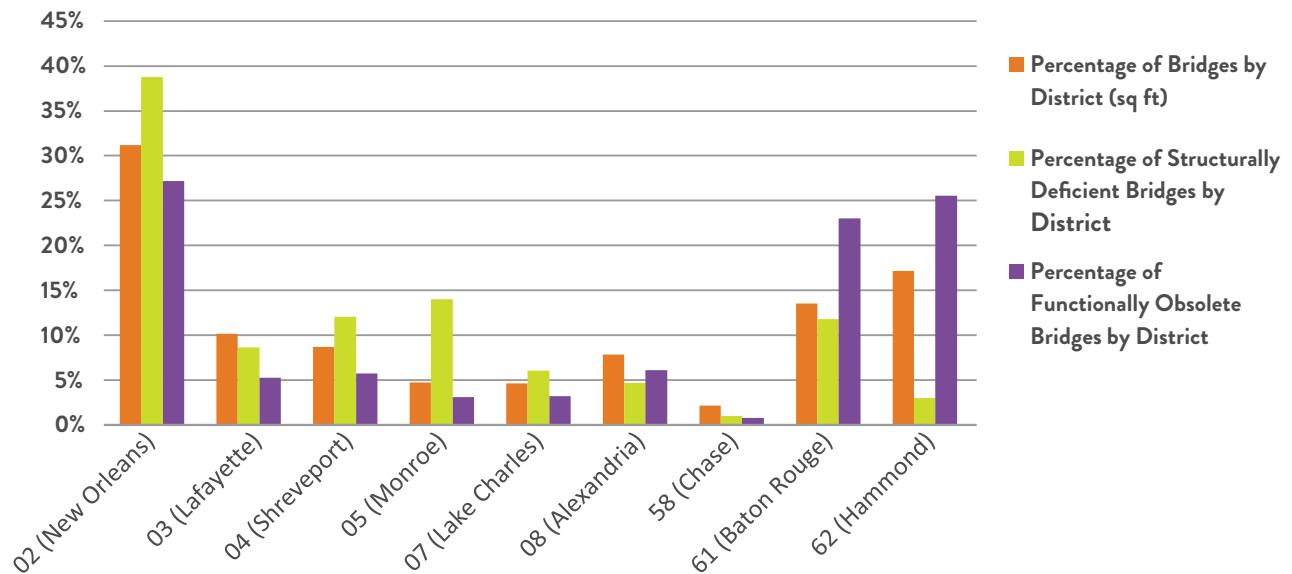
Table 1 is a summary of the key bridge data.

TABLE 1 – FHWA NHI 2016 DATA

LOUISIANA	
50 state ranking for bridges based on square foot of bridge deck	4
Number of bridges	12,915
Deck area (Sq. Ft.)	16,387,706
Number of movable bridges	145
Load posted bridges	1,900
Structural deficient bridges	1,739
Number of closed bridges	132
Average age (Years)	37
Population (in thousands)	4,670
Transportation Budget (FY 2016-2017)	\$647M
State gas tax	\$0.20

FIGURE 1

Louisiana Bridges by DOTD District



CONDITION AND MANAGEMENT

Capacity ↓ Down from 2012

The volume-to-capacity(V/C) ratio for bridge structures throughout most of Louisiana does not require substantial improvements in the near term. However, there are several bridge structures in New Orleans, Baton Rouge, Lafayette, Shreveport, Lake Charles, and Monroe that require additional bridge capacity to relieve travel times for users. Because of numerous waterways and bayous, several of the capacity bridge projects require substantial investment. Table 2 lists some of the large capacity mega bridge projects DOTD has identified. Without additional funding, constructing a majority of these needed projects is highly unlikely. The fact that DOTD has a plan to address Louisiana's capacity needs is encouraging, but over the last 5 years, there has been little to no additional funding to address capacity needs.



TABLE 2 – LOUISIANA 2015 UNFUNDED PRIORITIZED BRIDGE CAPACITY MEGAPROJECTS

LOCATION	FACILITY	LIMITS	IMPROVE- MENTS	TOTAL PROJECT COST (\$M)	DOTD MEGA PROJECT PRIORITY
Lafayette	I-49 South	I-10 in Lafayette to Lafayette Airport	Build new freeway	\$750	Priority A
Shreveport	I-20	Red River Bridge (I-49, Shreveport to Traffic St., Bossier City)	Widen to six lanes	\$135	Priority A
Lake Charles	I-10	I-210 to I-210	Replace bridge and approaches, widen to 6 lanes	\$500	Priority A
Baton Rouge	I-10	I-110 to I-12	Widen to 8 lanes	\$320	Priority A
New Orleans	I-10	William Blvd to Veterans	Widen to 8 lanes	\$150	Priority A
Baton Rouge	Baton Rouge North Bypass	I-10 to I-12	Build/ upgrade to 4-lane freeway, upgrade existing or build new MS River Bridge	\$1,000	Priority B
Baton Rouge	New Mississippi River Bridge	LA 1 to LA 30	New Mississippi River Bridge	\$800	Priority B
Monroe	New Bridge	Ouachita River in Monroe	New bridges and connector	\$150	Priority B
S. Central LA	LA 1 South	Golden Meadow to Leesville (Phase 2)	Complete two-lane elevated roadway	\$320	Priority B

Condition Down from 2012

13.5% of Louisiana's bridges (1,900) are load posted and over 132 are closed due to structural deficiencies. As an example, Florida has roughly the same number of bridges and bridge deck area but only 2% are structurally deficient, and 37 bridges are closed to traffic. An analysis of bridges that are load posted has shown that the bridges were not designed to carry or are no longer able to carry vehicles at a specified weight. The majority of all bridges that are posted are on state routes and local roads which carry some of the heaviest trucks.



Operations & Maintenance ↔ Same as 2012

Louisiana is also home to the largest number of highway movable bridges, which can be challenging when it comes to operations and maintenance. With numerous moving parts and a constant beating from traffic, maintenance and disruptions to traffic (highway and marine) are frequent. In several cases, movable bridges are located on hurricane evacuation routes and in some cases, these are the only routes.

Public Safety ↔ Same as 2012

14.7% of Louisiana's bridges (1,898) are classified as functionally obsolete; however, when the length of a bridge is taken into consideration, this number jumps up to 44%. With the evolution of the highway industry in 1960, the importance for safety, adequate shoulders, and barriers were realized. A majority of the functionally obsolete bridges are due to inadequate shoulders; furthermore, on some of the longer bridges, a shoulder could mean the difference of avoiding an accident. For example, the Causeway Bridge that crosses Lake Pontchartrain between Jefferson and St. Tammany Parish is 23.9 miles with no shoulder and has roughly 2,000 vehicle breakdowns a year, or 5.5 per day, with nowhere to pull over.

In 2016, the Greater New Orleans Expressway Commission (GNOEC) passed a \$1 increase for toll tags and \$2 increase for cash customers to improve the barrier on the southbound bridge and install several safety bays for an estimated construction cost of just over \$100M. Ideally, GNOEC could have upgraded both bridges entirely to current safety standards; however, this would have cost between \$1.8 – 2.0 billion, which would lead to \$25 - \$30 tolls.

Another key safety factor is redundancy. For example, 22% of the bridges in Louisiana are classified as fracture critical. A fracture critical bridge is defined by FHWA as a steel member in tension, or tension element, whose failure would probably cause a portion or the entire bridge to collapse. Majority of the truss bridges would be considered fracture critical.

FUNDING AND FUTURE NEEDS

Funding ↓ Down from 2012

Transportation funding in Louisiana has been stagnant since the 1990s. Louisiana last increased its state gas tax in 1989 as part of the Transportation Infrastructure Model for Economic Development (TIMED) program. With inflation and increased demand, Louisiana has been unable to affectively maintain its 12,915 bridges properly over the last 30 years. Louisiana's failure to meet these current and future transportation needs contributes to a lack of economic regional and national competitiveness. With nearly a \$13 billion backlog, not only does capacity suffer, but preservation, operations, and safety are also jeopardized.

Louisiana relies on federal funding for nearly half of its transportation funding. To the benefit of the transportation industry, Louisiana revised the statutes which protect these designated funds.



Although Governor Edwards task force recommendation is to raise DOTD's Revenues nearly \$700 Million per year to help reduce the number of deficient bridges while adding the needed capacity, there is no assurance that the Louisiana legislature will adopt such a measure.

Future Needs ↓ Down from 2012

By 2020, nearly 40% of Louisiana bridges and by 2025, nearly 50% will be beyond their 50-year design life. Although the bridges that are being designed and built today have a design life of 75 years or greater, almost every bridge constructed prior to 1980 was designed to last 50 years.

In 2012 and 2013, Louisiana constructed or replaced an average of 141 bridges per year; however, in 2014 only 78 bridges were constructed or replaced. Over the past 5 years, the constructed or replaced bridges only account for about 3% of the deficient bridges in Louisiana. At the current rate of replacement, the state and local bridge owners will continue to see the number of deficient bridges increase.

Resilience ↔ Same as 2012

This is an appraisal of the state's bridges against multiple extreme event loading and the subsequent ability to quickly repair damage with minimal effects to the public safety, the economy, and security. The extensive presence of water crossings within Louisiana's surface transportation system necessitates alternative routes. Most bridges are designed today by taking into consideration the extreme event loadings, such as wave and wind loads from hurricanes and flooding from a 500-year storm. Louisiana does have 1,320 bridges that are defined as scour critical, meaning, that in the event of a 100-year storm, the streambed material can be removed by swiftly moving water from around the bridge substructure, causing deep holes. These deep holes can result in loss of structural capacity, resulting in bridge closures.

After a significant storm event, appropriate authorities are required to inspect affected bridges for scouring. If needed, emergency repairs should be implemented. Resilience is expected to improve as more existing bridges are replaced to meet current design standards.

Innovation ↔ Same as 2012

As more of the aging infrastructure requires replacement, Louisiana has been proactive on ways to accelerate construction of bridges. FHWA has developed its Every Day Counts initiative to spur the adoption of new technologies and approaches, and one program it has advanced is Accelerated Bridge Construction (ABC). Because project access is costly due to our vast waterway and bayous, Louisiana has been at the forefront of ABC techniques to reduce project cost. For example, I-10 Atchafalaya Spillway, Bonnet Carré Spillway, Twin Spans, and Causeway Bridge's entire superstructure was built in construction yards and then barged to the project site.

Louisiana has completed several projects that focused on accelerating the construction of a bridge from months to days. For example, DOTD utilized Self-Propelled Modular Transporters (SPMT) to replace a bridge over I-20 near Monroe, LA (figure 2). The new bridge superstructure was fully built offsite, and traffic on I-20 was temporarily detoured while the new bridge was moved into place.

Traditionally, on highway construction projects, contractors bid on a set of plans prepared in advance. Over the past 10 years, Louisiana has adopted laws that allow for design-build (DB), construction management at risk (CMAR), and public-private partnership (P3),

which allows contractors and engineers to work together during the design phase, allowing for innovation. For DB, CMAR and P3 to work, funding must be identified, which has proven difficult on some the large mega projects.

FIGURE 2 - WELL ROAD OVER I-20 BRIDGE REPLACEMENT USING SPMT





BRIDGES



LET'S RAISE THE GRADE

- Significant increase in transportation and bridge funding is needed. Governor Edwards' task force has recommended a bold and aggressive plan to turn around our infrastructure, which will improve the grade.
- Focus on reducing the number of structurally deficient bridges to a manageable level, both structurally and functionally.
- Provide additional funding for operations and maintenance of the existing bridges.
- Continue to develop and implement an accelerated bridge construction program. Key construction techniques provide a safer construction zone for construction workers and the traveling public while potentially providing a lower total project cost.
- Increase transportation funding by an additional \$700M per year as recommended by the Governor's task force.
- Ensure the sustained sufficiency and reliability of the federal Highway Trust Fund by identifying and incorporating necessary additional revenue streams.

FIND OUT MORE

- <http://shrp2.transportation.org/documents/renewal/Louisiana.pdf>
- <https://fhwaapps.fhwa.dot.gov/lbtp/>
- <http://www.thecauseway.us/safety-improvements-presentation/>
- http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Transportation_Plan/2015_Statewide_Transportation_Plan/07_Megaprojects.pdf



WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S COAST

Coastal Louisiana is a valuable natural, economic, and cultural resource. This complex and fragile system is disappearing due to a wide array of natural (sea level rise, subsidence, storms, etc.) and anthropogenic (levee systems, oil and gas access canals, ship channels, etc.) causes. The Louisiana coast has tremendous economic value. It has the 2nd highest commercial landings in the United States; it provides a corridor for more than 11,000 vessels and 60% of the Nation's grain through the Lower Mississippi River; it supports U.S. jobs with an economic impact of approximately \$37B. Furthermore, it supports 90% of the nation's outer continental shelf oil and gas, 20% of the all domestic natural gas production, and it produces 25% of the nation's petrochemicals. Coastal Louisiana is home to millions of residents who live and work in a changing environment. Parishes within the coastal zone contain over one third of the herbaceous estuarine marshes within the contiguous United States. While remaining economically and culturally vibrant, this region has experienced widespread coastal erosion and land loss at a scale unrivaled by any other region within the United States.

CONDITION AND MANAGEMENT

Capacity and Condition ↔ Same as 2012

This section provides an overall evaluation and assessment of the physical conditions across Louisiana's coast.

Coastal Louisiana has experienced over 1,800 square miles of land loss since 1932, a reduction of nearly 25% of the total land area within the coastal zone. While varying in both time and space, the historic loss is pervasive across the entire region and continues to this day. In fact, due to increases in the rate of sea level rise and the ever-subsiding soils of the delta, future predictions of land loss under a changing climate are more dire than historic rates (CPRA, 2017a).



The evaluation and scoring effort here includes the following components:

- (1) Conditions of the existing restoration projects and how well they are performing: Existing coastal infrastructure generally performs well, and the State of Louisiana has a robust planning process to advance future engineering and construction.
- (2) Adequacy of the number of existing restoration projects: Despite the fact that the existing projects are performing well, a significant number of additional restoration and protection projects are needed to ensure a sustainable coast. There has not been sufficient funding available to implement projects to offset the alarming high rate of land loss. As such, land loss rates continued to exceed the restored areas by a wide margin. Increased investment is vital to the future productivity and security of the region in comparison to the land loss rates.
- (3) Effects of existing infrastructure: The Lower Mississippi River levee system provides flood protection and supports the navigation activities. However, it cut off the river's nutrients and sediment from the surrounding wetland areas, increasing their land loss rates; Oil and Gas infrastructures required construction of access canals and ship channels that altered the hydrology of the coastal area and negatively impacted their ability to accrete and keep up with sea level rise. Finally, oil spills (e.g. Deep Horizon incident) cause damage to the health and productivity of coastal wetlands areas.

Operations & Maintenance ↔ Same as 2012

The State has a network of established field offices to effectively monitor the performance and perform maintenance operations. Further, the state legislatively mandates a comprehensive master plan of coastal restoration and protection projects to be updated every five years. This mandate results in a systematic research and planning exercise to be continually updated with the most up-to-date available science and engineering. This has resulted in an extremely thorough process that involves hundreds of researchers, planners, engineers, and scientists. Dozens of technical, community, and governmental advisors are included throughout the process, which ensures a robust and inclusive planning process with buy-in from the many stakeholders of coastal Louisiana. One clear hurdle in constructing projects is the permitting process. Currently, the permitting process is financially quite costly, extremely time consuming, and cumbersome.

Development of Restoration Projects: This section outlines the variety of projects that are either implemented or are being developed:

Shoreline protection and beach nourishment: This type of project is spread across the entire land scape, spanning from Cameron Parish in the west side of the state to Plaquemines and St. Bernard parishes in the east and nearly all coastal parishes in between. Based on field visits, input from state coastal managers, and aerial imagery, these projects, generally, are in good condition. The state and parish governments are continuing to consider constructing these projects. The reasonable Operation and Maintenance effort, based on budget allocations outlined in the Coastal Protection and Restoration Authority's (CPRA) annual plans, toward these projects allowed them to function properly and meet their goals. Challenges facing these projects include settlement, damage due to storms, occasional vandalism, and continuous wear due to waves and tides.



*Shoreline protection project at Holly Beach.
(after Hurricane Ike)*



Sediment delivery to new marsh creation project site

Marsh creation: Based on past and future planned budgets, marsh creation is the primary restoration strategy adopted by CPRA. Similar to shoreline protection and beach nourishment projects, most of these projects are in good or very good condition. Most, if not all, of the projects are vegetated. Subsidence is the primary challenge of this type of project. Even when the project area is vegetated and gains elevation due to organic accretion, the subsidence and sea level rise ultimately overwhelms them and the marsh area becomes inundated.

Barrier islands: Considerable funds have been devoted to restoring the Barrier Islands. These natural features are remnants of old deltaic systems, as the Mississippi River migrated across Louisiana's coast. They are subjected to continuous erosive wave and tide forces, subsidence, sea level rise, and they are the first feature along the coast that encounter hurricanes. Because of these climate conditions, barrier islands require continuous maintenance and restoration. The barrier islands restoration projects perform well, but as they age, they naturally deteriorate.

Water control structures: Examples of this category include salinity control gates, freshwater introduction culverts, freshwater diversions (e.g. Davis Pond, Caernarvon), and weirs. The vast majority of these structures function as designed and they are structurally in good condition. However, due to limitations in maintenance budgets their conditions will deteriorate with time. Overall, this category can be considered marginally satisfactory.



Shell Island restoration project



Davis Pond freshwater diversion

Operation of Implemented Projects: Louisiana’s current planning budget is adequate for the current projects under design. However, to fully implement the Master Plan, the magnitude of funding dedicated to engineering planning will need to increase .

The portion of total expenditures spent on Engineering and Design services is currently adequate. This ratio should be maintained in the future as the budget for project implementation increases.

If current average expenditures continue into the future, there will be a large shortfall of funding needed for implementation of the state’s Master Plan projects. While the planning process and the engineering and design of these projects will likely be able to move forward, a lack of funding will greatly inhibit the state’s ability to build these restoration and protection projects.

A continued budget for operations and maintenance of built projects will only be pertinent if construction funding is procured. The funding for future construction appears insufficient; therefore, it would seem even more difficult to secure additional sources of funds for a robust O&M program of future restoration projects. As more projects are built, and funding becomes scarce, restoration planners and designers will need to balance the funding requirements of operating and maintaining built infrastructure with future construction of new projects.



FUNDING AND FUTURE NEEDS

Funding and Future Needs ↔ Same as 2012

The annual expenditures on coastal restoration and protection projects are outlined in CPRA's annual plans. A summary of these expenditures is outlined in Table 1. A breakdown of these expenditures over the past three years is summarized in Table 2. The fluctuations observed in these tables, especially in the operation and maintenance budget shown in Table 1, is partially attributed to recovery efforts in the wake of extreme events such as hurricanes. Overall, this level of funding is not adequate. While extensive effort is devoted to construct projects to sustain, restore, and protect the coast, land loss rates continues to far exceed land gained and sustained by the restoration and protection projects. Future funding levels, as outlined in the next section, are expected to be higher, but it will not be sufficient to offset land loss rates, especially if sea level rise occurs at the currently projected 50-year rates. Significant funding is needed from the Federal Government to assist Louisiana restoration and to protect a working coast with national interest, economically and environmentally.

TABLE 1: ANNUAL EXPENDITURES
(based on published CPRA annual plans)

YEAR	EXPENDITURES (MILLIONS \$)
2010	\$780
2011	\$637
2012	\$441
2013	\$960
2014	\$767
2015	\$725
2016	\$883
2017	\$735
2018	\$663
Average	\$732



TABLE 2: BREAK DOWN OF EXPENDITURES BY PROJECT PHASE
(based on CPRA published annual plans). Values are in Millions

	FY 2015	FY 2016	FY 2017	FY 2018
Construction	\$477	\$588	\$464	\$371
Engineering and Design	\$56	\$82	\$102	\$123
Planning	\$70	\$36	\$24	\$7
Operation, Maintenance, and Monitoring	\$26	\$101	\$87	\$97
Ongoing Programs and Initiatives	\$42	\$40	\$22	\$32
Operation Costs	\$54	\$38	\$38	—

The state's current Coastal Master Plan (the draft was released in January 2017) is based upon a \$50 billion program; the targeted budget will be split approximately in half between restoration projects and storm surge protection projects. To meet the proposed implementation schedule, sources for the entire \$50 billion will need to be identified by year 2050 (the year 2050 is identified as the last project implementation year within the 50-year planning period of the Coastal Master Plan). Continuing at the current mean annual funding rate of \$730 million will leave the Master Plan substantially underfunded. It should be noted that the Coastal Wetlands Planning, Protect and Restoration Act (CWPPRA) appropriated in 1990 has provided approximately \$50M per year. Future payments from the Deepwater Horizon penalty and settlement funds will likely provide some relief. From the settlement of the BP Exploration & Production Inc. ("BP"), arising from the 2010 Deepwater Horizon oil spill, Louisiana anticipates receiving more than \$6.8 billion. Including both the criminal and civil suits, Louisiana's total recovery from the Deepwater Horizon disaster will be approximately \$10 billion. However, a dedicated effort to attract funding from the Federal Government to address the funding shortfall will need to be undertaken to fully implement the Master Plan.

Resilience ↔ Same as 2012

The state's Coastal Protection and Restoration Authority (CPRA) has thoroughly documented the dire situation in which the Louisiana coastal zone will be in under a wide array of future climate conditions. Even under a non-worst case sea level rise scenario, more than 130 square miles of coastal wetlands are predicted to be lost in just the first decade of a future with no restoration action taken. This is more than double the 48 square miles of land benefitted by the last decade of restoration projects implemented by the CPRA. During later decades, the rate of land loss is predicted to accelerate, further increasing the deficit in land loss relative to the present rate of restoration benefits.

The historic and predicted future trends of land loss in the coastal zone are evidence of the fragility of Louisiana's wetland ecosystem. While the situation is severe, the CPRA has developed a detailed plan to implement a broad range of ecosystem restoration and storm surge protection projects. The thorough, objective planning process that has been put in place will serve the state well, as they continue to implement a widespread restoration program. The score of this section reflects the severity of the challenges facing coastal restoration projects and funding limitation, but not the level of efforts put forth by the State or local parish governments



Innovation ↔ Same as 2012

There is a tremendous amount of effort in academia, government agencies, non-government organizations, and the private sector to explore innovative ideas, strategies and solutions to the severe climate conditions to which Louisiana's coast and nearly all coastal regions worldwide are subjected. The goal of a resilient coast is not easily attainable in the face of these challenges. Louisiana's coastal master plan, in itself, reflects a thoughtful and systematic effort by the State to identify best available science to manage the coast. Recent efforts, such as the "Change Course" competition (<http://changingcourse.us/>), are also an excellent example of innovative thinking to identify ideas to design a more sustainable Lower Mississippi River Delta.

Establishing a Gulf Coast Ecosystem Restoration Council (www.resotrethegulf.gov) is a clear reflection to recognizing the complexity and massive challenges facing coastal areas. The Council intends to devote considerable funding levels to advance the science, engineering, and monitoring of the Gulf coastal areas.

Certainly, additional funding is required by both the federal and state governments of the Gulf region to identify innovative strategies to protect and sustain Louisiana and the entire Gulf coastal areas.



LET'S RAISE THE GRADE

- Continue to invest in expanding analysis, planning, and design expertise and knowledge in Louisiana. Ensure to leverage and build upon the solid foundation the state has already invested in.
- Secure reliable and sustained federal funding streams and support for restoration and protection projects.
- Attain national buy-in and collective ownership of Louisiana's coastal challenges. The entire nation benefits from energy development in Louisiana. The entire Mississippi watershed contributes to our coastal sediment deficit (damming) and our annual hypoxia challenges (agriculture and other nutrient loads). Sustaining Louisiana's coast is in the best interest of the nation.
- Dedicate (or continue to dedicate) new revenue streams such as off-shore revenue (GOMESA) to coastal restoration projects.

FIND OUT MORE

The following Sources were utilized in developing this report:

- Barnes, Bond, Burger et al. 2015. Economic Evaluation of Coastal Land Loss in Louisiana. Louisiana State University.
- Couvillion, Barras, Steyer, et al. 2011. Land area change in coastal Louisiana from 1932 to 2010: U.S. Geological Survey Scientific Investigations Map 3164.
- CPRA (Coastal Protection and Restoration Authority), 2017a. DRAFT Louisiana's Comprehensive Master Plan for a Sustainable Coast. Baton Rouge, State of Louisiana.
- CPRA (Coastal Protection and Restoration Authority), 2017b. DRAFT Fiscal Year 2018 Annual Plan.
- CPRA (Coastal Protection and Restoration Authority), 2017. Integrated Ecosystem Restoration & Hurricane Protection in Coastal Louisiana: Fiscal Year 2017 Annual Plan.



- CPRA (Coastal Protection and Restoration Authority), 2016. Integrated Ecosystem Restoration & Hurricane Protection in Coastal Louisiana: Fiscal Year 2016 Annual Plan.
- CPRA (Coastal Protection and Restoration Authority), 2015. Integrated Ecosystem Restoration & Hurricane Protection in Coastal Louisiana: Fiscal Year 2015 Annual Plan.
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- CPRA (Coastal Protection and Restoration Authority), 2012b. Integrated Ecosystem Restoration & Hurricane Protection in Coastal Louisiana: Fiscal Year 2012 Annual Plan.
- CPRA (Coastal Protection and Restoration Authority), 2011. Integrated Ecosystem Restoration & Hurricane Protection in Coastal Louisiana: Fiscal Year 2011 Annual Plan.
- CPRA (Coastal Protection and Restoration Authority), 2010. Integrated Ecosystem Restoration & Hurricane Protection in Coastal Louisiana: Fiscal Year 2010 Annual Plan.
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WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S DAMS

Summary: The State of Louisiana has a total of 557 dams in the National Inventory of Dams, of which 442 are privately owned and maintained. 494 of the dams are monitored by the Louisiana Department of Transportation and Development (DOTD) and 16 of the dams are monitored by the United States Army Corps of Engineers (USACE). The allocation of dams between DOTD and USACE is described in Louisiana Revised Statute (RS) 38 21-28. A total of 43 dams are considered high-hazard potential, which is defined as the failure or mis-operation of dams is expected to result in loss of life and may also cause significant economic losses, including damages to downstream property or critical infrastructure, environmental damage, or disruption of lifeline facilities. These high-hazard potential dams are inspected annually and have an Emergency Action Plan (EAP) in place. Many owners of privately-owned dams do not have resources to adequately maintain and repair their dams. Fortunately, most of the privately-owned dams are categorized as having a low hazard potential.

CONDITION AND MANAGEMENT

Capacity ↓ Down from 2012

The number of high-hazard potential dams has increased over the past 5 years from 33 to 43, indicating more exposure of risk to the public. Most of the dams in Louisiana are for recreational purposes, which are privately-owned and not utilized to manage water quality or flooding. Only 24 dams are used for water supply purposes. As such, only a small number of the dams' have a defined capacity of water. With changing demographics, the publicly-owned dams may require capacity increases.

Condition ↓ Down from 2012

As described in the dam hazard classifications, public safety is of most importance, as it relates to dam condition assessments. Condition assessments for each dam monitored by DOTD are available on the DOTD website, referenced at the end of the section. Annual inspections, along with routine maintenance and timely rehabilitation, are the keys to a satisfactory condition assessment rating. It is important that all High-Hazard Potential Dams have a satisfactory or a fair rating. To minimize impacts or failure of other infrastructure, it is also important that all Significant-Hazard Potential dams (a dam in which the failure or mis-operation is not expected to cause loss of life, but results in significant economic losses, including damages to downstream property, critical infrastructure, environmental



damage, or disruption of lifeline facilities) have a satisfactory or fair rating as well. The frequency of inspections and the level of service with respect to maintenance and repair are directly related to the funding availability. Therefore, the condition assessment grading illustrates how the available funding plays a role in the grading of the infrastructure.

The condition assessment of each dam, as it follows the National Dam Safety Review Board rating scale within each individual hazard potential group, was mainly used to evaluate the condition of Louisiana's dams. The condition assessments were collected for all the dams that have been inspected and evaluated by the DOTD since December 2012. A total of 502 dams were included in the scoring. The 502 included all of the High Hazard Potential Dams, all of the Significant Hazard Potential dams, and 409 of the Low Hazard Potential Dams.

Operations & Maintenance ↓ Down from 2012

The operation and maintenance (O&M) of the high-hazard potential and significant hazard potential dams is significant because 58% of those dams are publicly owned, and there are funding sources available to pay for it. The remaining 42% of the dams in these two categories, as well as 90% of the low hazard potential dams, are privately owned. The O&M of any dam is the responsibility of the owner, and many private owners do not have the necessary funding needed for the repairs identified in the inspections. Additionally, many of the owners may not be aware of the O&M needs of their dams until they receive a letter from the State Dam Safety Officer due to the lack of routine monitoring or inspections by the owners. High hazard potential dams are inspected annually and significant hazard dams are inspected every three years. The low hazard potential dams are only inspected once every five years, and in that time, erosion and infrastructure damage may occur. Privately-owned dams account for 81% of the dams in Louisiana, and although the repairs needed to them are minor, the amount of resources spent on O&M is very little.

Public Safety ↓ Down from 2012

Public safety is paramount in the classification of dams, and failure is not an option due to the direct impact to life and property. Emergency Action Plans are in place for all high hazard potential and significant potential dams. High hazard potential dams have the potential for loss of life in the event of failure. Louisiana executes an annual inspection and review of the EAP for such dams. Reportedly the high hazard dams receive proper operation and maintenance without established budget or reserves; costs are drawn from the State General Funds, which is under increasing pressure. Funding for federal dams is provided in one-year appropriations, and maintenance issues are addressed as needed.

FUNDING AND FUTURE NEEDS

Funding ↓ Down from 2012

Funding has remained generally constant over the past few years without regard to aging of the dams, increased costs (including inflation in materials and labor) for repairs, and rehabilitation of state maintained dams. The current budget for dam inspections performed by DOTD is \$500K annually with no appropriation for repairs. The current budget for dam inspections performed by the USACE is \$227K annually. The overall decline in state revenue adds pressure to delay scheduled inspections, routine maintenance, repairs and upgrades to existing dams. There is no funding for maintenance and repairs for private dams. The 2016 storms and resulting floods across the state add an increased need to inspect and repair both private and non-private dams to ensure their condition for future storm events



Future Needs ↔ Same as 2012

Approximately 80% of the dams in Louisiana are privately owned. In addition, only seven applications have been submitted for new dams indicating a limited need for new dams at this time. However, the majority of the dams in Louisiana were built before 1960 so it is likely that they are approaching the end of their design life. The State provides inspection services for private dams; however, the cost for operation, maintenance, and repairs must be addressed by the private owner because state funds are not available for these tasks. Many of the private owners do not have the resources or opportunities for funding the O&M of the dams. With the recent flooding across the State, dams may be a new way of mitigating impacts of large rain events. However, the funding is not there to support these future needs.

Resilience ↓ Down from 2012

Similar to the 2012 report card, the resilience by nature is low in dams. When it comes to dams, typically there is no redundancy in the infrastructure, so if the dam fails, there will be impacts, even if minor. Dams are designed for an appropriate frequency of storm event. Overall, based upon the purpose of the majority of the dams, the duplication of the infrastructure is not a typical design approach.

Innovation ↔ Same as 2012

Innovative engineering solutions to inspect, repair and replace older dams can save time and money. This is an important factor when funding is limited. Some newer survey technologies are being used, such as LIDAR and underwater remote sensing. Newer technology still has a possibility to be used in special or emergency inspections, such as geophysical techniques using Electrical Resistivity Tomography. The Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) continues to operate the Louisiana emergency alert and warning systems. Several technologies, such as Alert FM, National Oceanographic and Atmospheric Association (NOAA), and Weather Radio and Emergency Alert System facilitate emergency communications.



LET'S RAISE THE GRADE

- Increase annual investment levels for publicly-owned dam repair, reconstruction, and renovation.
- Communicate or provide access to available grants for private funded dams needing repair/assistance.
- Continue to develop and apply remote sensing technologies to efficiently collect data on dams.
- Make identification of potential funding sources for operation and maintenance and rehabilitation a priority.
- Communicate to private dam owners the best practices for how to maintain their dams.

FIND OUT MORE

The following Sources were utilized in developing this report:

- National Inventory of Dams, <http://nid.usace.army.mil/>
- Review of Condition Assessments performed for Louisiana Dams, 2012-2017
- Interview with Ryan Reves, P.E., Dam Safety Program Manager, Vicksburg District, Corps of Engineers, December 2, 2016.
- Interview with Ed Knight, P.E., Dam Safety Program Manager, DOTD, August 3, 2016.
- "Water Use in Louisiana, 2010", State of Louisiana DOTD Public Works and Water Resources Division in cooperation with the U.S. Geological Society, 2011 (Revised December 2012).
- DOTD Website http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Public_Works/Dam_Safety/Pages/default.aspx



DRINKING WATER

GRADE: D-

WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S DRINKING WATER

Louisiana is in the enviable position of having a relative abundance of water from which to draw for domestic, industrial, and agricultural needs. According to the [United States Geological Survey](#) (USGS) 2016, approximately 17.5% of the state is covered by water. Louisiana is also underlain by 11 aquifers and aquifer systems. These sources represent an ample resource for the state. In spite of this, there are areas of the state facing future and in some cases, current struggles to meet potable water demands due to aging and deteriorating water systems, as well as threats to the quality of water supplies. USGS 2011 estimates that approximately 9% (746Mgal/d) of the water usage for Louisiana can be attributed to public drinking water supply, the focus of this report, which covers 88% of the state's population. The other 12% of Louisiana's residents derive water from private wells. Approximately 49% of public supply water is drawn from aquifers with the remaining 51% taken from surface water sources.

There are a number of potential threats to the public water supply, such as over-pumping of aquifers which leads to groundwater depletion and increased potential for saltwater intrusion. Increased groundwater drawdown has also been shown to increase the risk of downward migration of potential contaminants contained in shallower, non-drinking supply groundwater. Both surface and groundwater sources are potentially at risk of contamination from anthropogenic sources. The town of St. Joseph, LA is currently in the national spotlight after Governor John Bel Edwards declared a state of emergency over elevated concentrations of lead and copper detected in the town's water system. State officials warn that problems caused by a lack of upkeep of infrastructure, such as those in St. Joseph, could take years to correct. The St. Joseph water crisis should punctuate the importance of investing in the maintenance of public water supply systems and protection of water resources. It is imperative that there is strong planning and increased funding in place for the future of Louisiana's growing drinking water needs, and this will ultimately raise the overall grade.



CONDITION AND MANAGEMENT

Capacity ↔ Same as 2012

Data available through DHH and current census data indicates that 80% of the parishes in Louisiana meet or exceed coverage in providing water to residential systems. The parishes falling short are dominated by rural communities. However, up to 20% of the residential population may not have reliable access to a public water supply. Additional backup power, pumps, and treatment stations could help increase capacity and create system redundancy. According to interviews conducted during this report, some of these items are in progress, but the overall state water system is still lacking.

According to a 2010 study done by DOTD which is titled, *Water Use in Louisiana, 2010*, Louisiana draws a total of approximately 8,500 million gallons per day (MGD) from groundwater and surface water sources combined, and 9% of which can be attributed to public drinking water supply. From 2005 to 2010, the amount of water drawn from these sources has decreased 17%, with surface water withdrawals decreasing nearly 19%.

Condition ↓ Down from 2012

Louisiana's drinking water infrastructure is aging, and little is being done to replace or upgrade many of the current systems in place. DHH PWS database shows that nearly 58% of the infrastructure in place was constructed before 1960, making some systems almost 60 years of age. Many of these systems are neglected until an immediate need arises, such as a significant leak in the pipe network. Given the lack of available data, it is difficult to assess specifics of system components, but it is likely that some of the materials used to construct older systems are no longer used in the industry. Funding for these systems is also lacking, creating a difficulty in keeping these systems maintained, updated, and replaced when needed. As mentioned in the capacity section, additional backup power, pumps, and treatment stations could help provide system redundancy and security of water supply. These additions could also help alleviate some stress on older systems that are at risk of component shutdowns as repairs and replacements become necessary.

Operation and Maintenance ↔ Same as 2012

Repair and replacement of the infrastructure in place is lacking due to insufficient funding available. Due to the age of the current systems in place, the need for maintenance and replacement of components is expected to increase due to age-related deterioration. Since much of the drinking water infrastructure is currently older than its intended design life, the need for maintenance becomes more frequent, ultimately resulting in compounding costs.

Public Safety ↔ Same as 2012

The Wellhead Protection Program was created in 1989 by the Louisiana Department of Environmental Quality (LDEQ) as a result of the Safe Drinking Water Act Amendments of 1986, and it was designed to protect public drinking water sources. Wellhead Protection Programs include contingency plans for water treatment, distribution, short term alternatives, as well as other elements to ensure the public well is safe and readily available for use. Currently, fewer than 70% of Louisiana's PWS utilizing aquifer sources have Wellhead Protection Plans in place. However, according to LDEQ, all areas served by groundwater sources are in the process of acquiring approved wellhead protection plans. Additionally, approximately 30% of parishes are susceptible to saltwater intrusion.



FUNDING AND FUTURE NEEDS

Funding ↔ Same as 2012

As in 2012, funding is the primary shortfall for drinking water infrastructure. With the current economic climate and the state's budget deficit, the state is hard pressed to increase investment. The 2013 EPA Needs Assessment Report states that Louisiana's 20-year funding needs exceed \$5 billion, a figure that greatly exceeds the funds available through the revolving loan fund allotment for the state (approximately \$280 million).

Future Needs ↔ Same as 2012

According to Louisiana.gov, the current population of the state is approximately 4.67 million and is projected to grow to as much as 4.94 million by 2025. Given the water supply and capacity insecurities laid out in the previous sections, as well as the persistent funding shortfalls, Louisiana's drinking water infrastructure has many looming needs and little plan to address them.

Resilience ↑ Up from 2012

In the previous report card, resilience was graded as a D+ due to the lack of backup power supplies, backup pumps, and other means of system redundancy. Interviews with those involved with the previous report, as well as with DHH, indicate that a number of power generators were put in place or added to the list of projects to be completed as soon as funding becomes available. Although the total percentage of systems with backup power could not be fully determined in this report, an improved grade has been given to this category.

Innovation ↔ Same as 2012

The State of Louisiana, the Capitol area in particular, had a number of outreach programs through organizations such as the Water Institute of the Gulf, Office of Conservation, and DNR, which can help promote public education and awareness regarding the importance of water resource protection. However, according to the 2013 national Needs Assessment Survey, Louisiana trails well behind the national average (5%) for percentage of "green needs" water infrastructure projects.



**DRINKING
WATER**



LET'S RAISE THE GRADE

- **Create additional system redundancy through backup power and additional pumping and treatment station.** Currently, the state struggles at times to provide potable water to all of its citizens under normal circumstances. This would be greatly exacerbated by a natural disaster, such as a heavy storm or hurricane, which can inhibit recovery efforts. A plan should be set to get the state's major population centers working toward such redundancy by 2020.
- **Increase investment from all levels of government and the private sector, to repair, improve, and expand the state's water infrastructure.** The persistent theme of water infrastructure shortcomings in the state is a lack of funding needed for improvements. An increase in funding through state and federal grants, loans or other means should be a priority by 2020.
- **Ensure the sustained sufficiency and reliability of the revolving loan fund** by ensuring that projects listed in the Needs survey are completed and repaid in a timely manner.
- **Expansion of statewide wellhead protection plans.** Currently fewer than 70% of Louisiana's public water supply systems have a wellhead protection plan in place. The state should aim to have at least 80% protected by 2020.

FIND OUT MORE

The following sources were utilized in developing this report:

- Statewide list of Public Water Systems: https://sdw.oph.dhh.la.gov/DWW/Maps/Map_Template.jsp
- DNR, 2012, Managing Louisiana's Groundwater Resources: <http://www.dnr.louisiana.gov/assets/docs/conservation/groundwater/12.Final.GW.Report.pdf>



DRINKING WATER



- Larsen et al, 2016: Application of Environmental Tracers in the Memphis Aquifer and Implication for Sustainability of Groundwater Resources in the Memphis Metropolitan Area, Tennessee. http://ucowr.org/files/Journal/Issues/159/159_Larsen_et_al.pdf
- Louisiana Water Company Quality reports: <http://www.louisianawater.com/water-quality-a-protective-devices/2012-11-19-00-54-30.html>
- Louisiana Rural Water Association: <https://lrwa.org/resources/system-operator-info/>
- Southern Regional Water Program: <http://srwgis.tamu.edu/louisiana/program-information/louisiana-target-themes/water-quantity-policy/>
- <http://srwgis.tamu.edu/louisiana/program-information/louisiana-target-themes/drinking-water-and-human-health/>
- USGS Gulf state water resources: <http://la.water.usgs.gov/>
- DEQ Drinking water protection: <http://www.deq.louisiana.gov/portal/PROGRAMS/DrinkingWaterProtectionProgram.aspx>
- LA water use 2010: <http://la.water.usgs.gov/publications/pdfs/WaterUse2010.pdf>
- Water Woes: http://www.lpb.org/images/lps_uploads/201207waterwoes2.pdf
- Water coverage by state: [U.S. Department of the Interior | U.S. Geological Survey URL: http://water.usgs.gov/edu/wetstates.html](http://water.usgs.gov/edu/wetstates.html)
Page Contact Information: [Howard Perlman](#)
Page Last Modified: Thursday, 27-Oct-2016 08:57:33 EDT
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DRINKING WATER



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- Drinking water revolving fund annual report: http://new.dhh.louisiana.gov/assets/oph/Center-EH/DrinkWaterRevolve/DWRLF_Financial/Annual_Report_SF2015.pdf
- Louisiana Intended Use Plan: http://new.dhh.louisiana.gov/assets/oph/Center-EH/DrinkWaterRevolve/DWRLF_Financial/2016_Intended_Use_Plan.pdf
- 2012 report card: http://www.infrastructurereportcard.org/wp-content/uploads/2013/02/ASCE_Louisiana_Infrastructure_ReportCard2012.pdf
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- Wellhead protection brochure: <http://www.deq.louisiana.gov/portal/Portals/0/evaluation/aeps/DWPP/WELLHEAD%20PROTECTION%20BROCHURE%20%20web%20version.pdf>



INLAND WATERWAYS

GRADE: D-

WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S INLAND WATERWAYS

Louisiana has almost 5,000 miles of navigable rivers, bayous, creeks, and man-made canals. The largest of these natural waterways is the Mississippi River, which winds its way to the Gulf of Mexico. There are numerous navigation canals and ship channels that link many of Louisiana's 38 public ports to the inland waterways across the state. The largest of these is the Gulf Intracoastal Waterway, which is the Gulf Coast portion of the Intracoastal Waterway, extending from Boston, Massachusetts to Brownsville, Texas. Such an extensive network of waterways in Louisiana requires 20 locks, dams, and control structures to manage water levels for safe navigation, as well as flood control. Louisiana is the nexus for the Mississippi River and its tributaries and the Intracoastal Waterway. Commodities from 28 states and Canada rely upon the Mississippi River for global trade.

The lower Mississippi River is often called the Gateway to the Americas. In 2015, the U.S. Army Corps of Engineers (USACE) ranked three deep-draft ports on the lower Mississippi River (South Louisiana, Greater Baton Rouge, and New Orleans) among the top four United States ports in terms of tonnage.

Barge transportation on the nation's inland waterways is a safe and cost-effective alternative to trucks and rails. A single 15-barge tow equals about 225 railcars or 870 tractor-trailer trucks. Only the lower Mississippi River section that is below Baton Rouge is authorized a depth of 45 feet to accommodate deep-draft ships. Planning by the USACE is underway for a deepening to 50 feet to accommodate the larger container ships that can now transit the Panama Canal. These ocean-going vessels carry imports and exports between the U.S. and the world.

The survey information provided by Louisiana's public ports was used to compile this report card based on their knowledge and experience with the Louisiana inland waterway system. Information on the Inner Harbor Navigation Canal (IHNC) Lock Replacement at New Orleans was provided by the USACE on the project website in 2017.



CONDITION AND MANAGEMENT

Capacity ↓ Down from 2012

Most users on major rivers and canals were very satisfied with the navigational capacity to handle business for the next 10 to 20 years on their waterways, but users on smaller, shallow canals, reported that their inland waterways do not have the capacity to even handle their current needs.

Numerous studies by the USACE indicate that the current IHNC lock, built in 1923, has limited capacity relative to both the volume of traffic transiting this lock and the size of the tows. Frequent or prolonged lock outages will have severe detrimental impacts on the capacity of the entire GIWW system, since the only viable alternate route would take 17 days, according to the USACE.

Condition ↓ Down from 2012

Most users on major rivers and canals were satisfied with their conditions and believe they are reliable and safe with regards to navigation, but users on smaller, shallow rivers and canals reported that their inland waterways are now in critical condition, and they risk losing business because it affects capacity, reliability, and safety.

Although the mechanical and electrical systems are routinely maintained at the IHNC lock, the infrastructure below water level, i.e. concrete and timber pile foundations, are original to 1923, and the conditions are not readily apparent.

Operation and Maintenance Waterways ↓ Down from 2012

The entire U.S. inland waterway system is under the jurisdiction of the USACE, which is responsible for the operation and maintenance of its infrastructure. In addition to the operation and maintenance (O&M) of the locks, dams, and control structures on these waterways, the USACE has dredging responsibilities within the authorized navigational channel to the authorized depth, but funding shortfalls often delay maintenance dredging, especially after large deposits of sedimentation from floods and storm surges suddenly reduce navigational draft.

Shoaling on any part of a navigable waterway has major impacts on the system. This vast inland waterway system is an extremely critical infrastructure. Draft lost due to siltation in the navigational channel means a vessel must carry less cargo. In the lower Mississippi River, especially at its delta, deep-draft vessels that cannot transit with maximum cargo load have a negative national economic impact of approximately \$1 million per day per foot of lost draft, according to the Port of New Orleans.

All users felt that the inland waterway system could be operated and maintained better. Given the age and usage of the IHNC lock, major maintenance is planned regularly by the USACE and advance notice is given to waterway users, but unplanned, short-term outages do occur and can disrupt marine traffic across the GIWW with little notice.



Public Safety ↓ Down from 2012

Public safety is a team effort of waterway stakeholders, which includes vessel operators, dock owners, port authorities, and government agencies having jurisdiction, such as the USACE and U.S. Coast Guard. Wherever the public can access a waterway, there is also risk. User opinions varied from fair to excellent regarding the safety records of their respective waterways.

FUNDING AND FUTURE NEEDS

Funding ↓ Down from 2012

Funding for the inland waterway infrastructure is a federal responsibility. Most users responded that the system is somewhat unfunded, while other users are experiencing severe underfunding of inland waterway infrastructure servicing their area. It should be noted that the IHNC lock is one of the busiest locks in the nation. Studies and preliminary plans have been discussed since 1956, which was when the replacement lock was first authorized. The USACE's current project budget is nearly \$1 billion, but there is no funding authorized for a replacement lock project as of this report.

Future Needs ↓ Down from 2012

A majority of users do not believe the inland waterway system is likely to receive adequate funding to meet future needs, and this is probably because history has shown that the needs far surpass the funding that will be available.

The USACE recognizes that the IHNC lock is a vital link in the GIWW system because it links the Mississippi River to the eastern GIWW. The USACE's 2017 draft General Reevaluation Report and Supplemental Environmental Impact Statement cites a B/C ratio of 4.7 for the replacement of the existing 640 feet long by 75 feet wide by 31.5 feet deep-draft lock with a 900 feet long by 110 feet wide by 22 feet shallow-draft lock. It also estimates that project completion will take 13 years after the authorization of funds. That would entail the current lock being in service for possibly 100 years, even if funding was available soon.

Resilience ↓ Down from 2012

Louisiana has experienced many natural hazards, from Category 5 hurricanes and tornadoes to record rainfalls and floods, especially those in low lying coastal areas and inland waterways. Users have also experienced major hazardous material spills from marine accidents in the waterways and the Deep-Water Horizon oil spill along the Gulf Coast. Majority of users responded that those responsible for expeditious recovery and restoration of operations demonstrated fair to extremely good resiliency at their respective waterway.

Innovation ↓ Down from 2012

Considering the current process to plan, design, perform major maintenance and repairs, and build new infrastructure on inland waterways, a majority of users rated the management of the inland waterways system as fairly innovative. It should be noted that users who are dissatisfied with the capacity, condition, or O&M of their respective waterway believe more innovation is sorely needed for the planning, design, permitting, and construction of a \$1 billion, 13-year federal project to build a replacement IHNC lock.



**INLAND
WATERWAYS**



LET'S RAISE THE GRADE

- Increase the USACE budget for operation and maintenance of the navigable waterways for dredging, locks, dams, and control structures on these waterways.
- Innovate the funding, planning, permitting, engineering, and construction of improvements needed on the inland waterway system to reduce project cost and expedite completion of projects.
- Fund the replacement of the Inner-Harbor Navigation Canal at New Orleans and expedite the project schedule.

FIND OUT MORE

The following sources were utilized in developing this report:

- USDOT, Bureau of Transportation Statistic, Port Performance Freight Statistics Program, Annual Report to Congress 2016.
- Louisiana DOTD, Status Report on the Port Construction and Development Program Priority Program, 23rd Annual Report February 2016.
- USACE, Planning Center of Expertise for Inland Navigation, Louisiana, 2015 <http://outreach.lrh.usace.army.mil/states/LA/Louisiana%202015.pdf>
USACE, An Overview of the U.S. Inland Waterway System, Navigation Economic Technology Research Program, November 1, 2005.
- USACE, New Orleans District, Projects, IHNC Lock Replacement, March 2015 <http://www.mvn.usace.army.mil/About/Projects/IHNC-Lock-Replacement>



WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S LEVEES

Louisiana sits at the base of the Mississippi River Drainage Basin – the third largest drainage basin in the world. Tributaries reaching into portions of 31 U.S. states and 2 Canadian provinces feed into the Mississippi River, which snakes through Louisiana and into the Gulf of Mexico. This location on the Gulf of Mexico often puts Louisiana in the path of tropical storms and hurricanes that push tidal surges many miles inland. Levees are instrumental in ensuring that this water is controlled, especially in the case of floods and severe weather. Levees are man-made structures consisting of earthen embankments and pile supported reinforced concrete. They are part of complex flood control systems that also include associated structures such as flood gates, control structures, surge barriers, spillways and pump stations, all of which work together and are vital to preventing damage in the case of high-water events.

To protect property and lives from severe flooding, Louisiana relies on more than 2,800 miles of levees that are critical flood protection for more than 19,000 square miles of land area as well as the state's residents and economy. Of these, approximately 2,500 miles are river levees and 365 miles are hurricane protection levees. All 2,800 miles are under the jurisdiction of 27 levee districts.

Flooding from the Mississippi River was a problem in Louisiana and the U.S. throughout its history. French settlers built levees around New Orleans as early as 1717. The historical flood of 1927 resulted in the flood control act of 1928 which established the federal government, through the U.S. Army Corps of Engineers (USACE), into the design and construction of flood control structures. With 100% financing by the federal government, the USACE oversaw the design and construction of many miles of robust levee systems as part of the Mississippi River and Tributaries (MRT) project.



Following Hurricanes Katrina and Rita in 2005, Congress provided \$14.5 billion to rebuild and strengthen Southeastern Louisiana's levees. This legislation included the Hurricane and Storm Damage Risk Reduction System (HSDRRS) standards which adopted the 1.0% chance of occurrence storm (100-year storm) as the design level. Therefore, the new levees are robustly designed and constructed to heights of between 10.5 feet and 30 feet high which is insufficient for action against Category 5 storms. It is believed that a risk-based evaluation of the levees would result in a greater elevation standard more consistent with the standards used by the USACE as part of the Mississippi River and Tributaries (MR&T) system which is a 0.1% to 0.2% annual chance of exceedance storm level or a 1,000-year to 500-year flood event, respectively.

CAPACITY AND CONDITION

Capacity ↑ Up from 2012

Levees were evaluated based on a 100-year flood level for Capacity. While we have recognized this as a flood level that is too low, we graded the Report Card against the existing standard for flood level. If the levee met the 100-year levee level of protection under all design criteria, it was given an A for Capacity. If it met only old (pre-Katrina) design criteria, it was given a B. If it met the 100-year level of protection but did not meet other design criteria, it was given a C. A levee that met its authorized elevation that is below the current 100-year elevation and did not meet other design criteria was given a D. Finally, if the system had additional deficiencies, it was given an F for Capacity. Approximately 50% of the systems evaluated were judged average or above. The remainder are considered unacceptable with grades as low as F in areas that are initiating protection projects.

Condition ↑ Up from 2012

Levees are primarily constructed of earthen materials. Where sufficient space is not available, pile supported floodwall (T-Walls) or continuous sheet pile floodwalls (I-Walls) are installed to provide adequate levels. Drainage and navigation floodgates, locks, and pumping stations comprise penetrations through the system and are designed as flood protection features. All earthen and structural flood protection elements are inspected at regular intervals.

Condition of the system considers how flood protection functions against flood events. The evaluation is based on routine inspections conducted by the USACE; the levee districts; State of Louisiana, Department of Transportation and Development (DOTD); and Coastal Protection and Restoration Authority (CPRA). Current inspection reports justify improved grades for the Condition factor in several levee districts. Inspection reports are generally more complete and detailed and performed at more regular intervals. CPRA collects and evaluates these data and has taken an active lead in levee inspections.



Public Safety Up from 2012

Levees protect over 3 million people and hundreds of billions of dollars in property and infrastructure in Louisiana. Losses from levee failures during Hurricane Katrina included 1,300 lives and over \$200 billion in property damage. Each year, as the snow melts in the mid-west, the Mississippi River Levees are tested. In 2011, historic high water levels were recorded at every gauge in Louisiana, yet the public was largely unaffected, and the estimated property damage that was prevented exceeded \$68 billion.

In addition to the Federal Levees, other levees in the state should be regularly inspected and evaluated. There are 118 FEMA levee systems that comprise an additional 485 miles of flood protection that have been identified as needing inspection. Additionally, other nonfederal levees, which protect local municipalities and subdivisions, are not currently inspected and reported on. We suggest regular inspections for the FEMA levees and nonfederal levees so that they may be included in the next report card.

Consideration should also be given to decisions which were made during the design of some types of floodwalls. Steel piling which were used to support the T-walls were not coated to resist corrosion. The decision was made to increase the thickness of the steel pilings rather than using coatings to reduce corrosion. Studies are underway to verify the effectiveness of this approach. Flexural stresses in T-Wall battered piles induced by the levee settlement are being evaluated the USACE.

Katrina-related structural failures of the 17th Street Canal, London Avenue Canal, and potentially, Inner Harbor Navigation Canal I-walls were attributed to excessive deflection generated by unanticipated hydrostatic forces on the floodwall. Subsequent HSDRRS guidelines limited the height of I-walls -steel sheet piling capped with concrete – to 4 feet. Many floodwalls exceed this limit. This was not considered in this report card, but should be considered in future grading.

Resilience Same as 2012

Levees need to have the capacity to resist scour and erosion for extended periods from currents or overtopping of flood waters and waves if conditions exceed the 100-year elevation. This is provided by armoring of levee slopes and with proper vegetation. Levees were judged based on armoring, vegetation, and seepage related issues. With the exception of the levees improved after hurricane Katrina by the additional of splash blocks and have been or are planned to be armored with vegetative mats, little has been done since the last report card in 2012 to improve the resilience of levees in Louisiana.

FUNDING AND FUTURE NEEDS

Funding Same as 2012

Funding grades were assigned based on the type of upgrades needed for any individual system, whether large funding sources are required, and whether such funds are available. Funding for major maintenance for the MR&T is provided by the USACE and authorized by Congress. Local levee districts and municipalities are responsible for operation and maintenance for their own systems once completed. Previously, local taxes were generally sufficient for Operations and Maintenance (O&M) and minor repairs; however, many of these local entities will not generate sufficient funding to adequately maintain their systems. For example, levee districts like the Lake Borgne Basin and West Jefferson have annual shortfalls of \$3.5 and \$5 million respectively as a result of O&M of the HSDRRS features.



The MR&T Project, a comprehensive river management program managed by the U.S. Army Corps of Engineers, provides protection to the 36,000 square-mile lower Mississippi Valley. A recent re-evaluation of the MR&T system's performance and capabilities to handle the project design flood has been undertaken. In the 2012 Report Card, the MR&T was incomplete with 70 miles of levees in Louisiana still not completed to design height above the flood elevation (freeboard). Only 20 miles of levees have been raised since.

Operations & Maintenance ↔ Same as 2012

Grading for O&M was based on whether or not funds, equipment, and personnel are adequate to meet or exceed O&M requirements. O&M of levees within Louisiana is largely accomplished by local levee districts with money acquired through ad valorem taxes as well as state appropriations. The USACE funds provide most of the O&M criteria for major maintenance of Mississippi River levees. Funding sources for general O&M from the state and local parishes are generally adequate. These funding sources are directed to minor slough repairs, rutting, mowing, and other minor maintenance needs. However, local tax millage and state appropriations are currently insufficient to pay O&M costs for major HSDRRS features. These features such as the Inner Harbor Navigation Canal Surge Barrier (IHNC), the West Closure Complex (WCC), and the Permanent Canal Closure and Pumps (PCCP) will require millions of dollars on an annual basis for Operation, Maintenance, Repair, Rehabilitation and Replacement (OMRR&R). Additionally, the local entities are responsible for raising earthen levees in order to mitigate ongoing settlements, geologic subsidence and sea level rise. While the Water Resources Reform and Development Act of 2014 stipulates that the USACE share the OMRR&R of the levee lift and projects like the IHNC, WCC, and PCCP at a 65%/35% cost share, Congress has not appropriated funds for this requirement.

Future Needs ↔ Same as 2012

According to the 2017 Draft "Comprehensive Master Plan for a Sustainable Coast," \$19 billion is needed for structural risk reduction in Louisiana. According to the Master Plan, this investment will save more than \$8.3 billion in annual economic damage by year 50, meaning such investments will pay for themselves over the course of plan implementation. An additional \$6 billion is needed for nonstructural risk reduction. CPRA, the agency responsible for drafting and publishing the Master Plan, is dedicated to identifying projects to be included in the document as well as securing funding for project implementation.

Innovation ↔ Same as 2012

Perhaps the most exciting advancements in levee and flood control structure design are those associated with remote sensing and real-time monitoring. It is now possible to couple Shape Accel Array (SAA) inclinometers, GPS monitoring sensors, robotic total stations (RTS), strain gages, and vibrating wire piezometers that measure water pressure, through cost efficient data logging and communication technologies. These new instruments provide data to assess whether a levee is performing as designed. Another advanced technology implemented involves interferometric synthetic aperture (InSAR) monitoring of the HSDRRS system. This technology involves repeat measurements and processing of space and airborne radar scenes to determine whether vertical changes in elevation or subsidence of the ground surface and HSDRRS components are occurring. The rapid adaptation of drone technology is being harnessed to map areas and populate geographic information systems at an astounding rate.



LET'S RAISE THE GRADE

- Congress must fully appropriate authorized funding for adequate O&M for the new HSDRRS for the gates and pump stations, as well as future levee lifts to maintain the 100-year elevation as levees subside and sea level rises.
- The Mississippi River and Tributaries system is still below freeboard grade (ultimate height above design flood event) in limited areas. The low portions of the levee should be elevated to provide adequate freeboard.
- The federal government should provide funding to update hurricane protection levees in Louisiana that do not meet the 100-year level or do not meet current design standards. This current design event should be re-evaluated and revised to a higher level. Re-evaluation should consider potential risks and losses.
- The federal government should provide funding to install, maintain, and monitor instrumentation for flood protection structures. This recommendation is made to mitigate risk and develop the design basis for future flood protection improvements.
- Consider alternative funding sources, and other risk reduction measures such as better outreach/education and warning and evacuation systems if additional federal funding is not forthcoming.

FIND OUT MORE

The following sources were used to develop this report:

- Draft, 2017 Louisiana's Comprehensive Master Plan for a Sustainable Coast, <http://coastal.la.gov/our-plan/2017-coastal-master-plan/>



Questionnaire Responses

1. Bossier Levee District
2. Caddo Levee District
3. Fifth Louisiana Levee District
4. Natchitoches Levee and Drainage District
5. Nineteenth Louisiana Levee District
6. Pontchartrain Levee District
7. Red River Atchafalaya and Bayou Boeuf Levee District
8. Red River Levee and Drainage District
9. Southeast Louisiana Flood Protection Authority – East
10. Southeast Louisiana Flood Protection Authority – West
11. South Lafourche Levee District
12. Tensas Basin Levee District
13. Terrebonne Levee District
3. Grand Isle Independent Levee District, 4th Quarter
 - Back Levee
 - Dune Levee
4. Lafitte Area Independent Levee District; 3rd Quarter
 - Fisher Basin Levee
 - Penn Levee
5. Lafourche Basin Levee District; 3rd Quarter
6. Plaquemines Parish Government; 4th Quarter
7. Pontchartrain Levee District; 4th Quarter
8. South Louisiana Flood Protection Authority – East; 4th Quarter
 - Lake Borgne Basin Levee District
 - Orleans Levee District
 - East Jefferson Levee District
9. South Louisiana Flood Protection Authority – West; 3rd Quarter
 - HSDRRS
 - MRL

CPRA 2016 Inspection Reports

1. Atchafalaya Basin Levee District; 4th Quarter
2. City of Baton Rouge, Parish of East Baton Rouge, Department of Public Works
10. South Lafourche Levee District; 4th Quarter
11. St. Mary Levee District; 4th Quarter



WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S PORTS

The Louisiana public ports system is comprised of 38 public port authorities. These public ports regulate, plan, design, develop, operate and manage port facilities and related infrastructure. Generally, the ports of Louisiana are categorized into the following interest groups: deep-draft, coastal, inland, and emerging or developing ports. The six deep draft ports focus on freight movements with national and international connections. The nine coastal ports concentrate on the oil and gas service industries, shipbuilding, and fabrication. The inland ports service local markets for cargo movement, manufacturing, and related service industries.

The majority of capital funds for port infrastructure in Louisiana come from the ports, themselves, in the form of bonds and capital reserves from self-generated revenue. These revenue sources are under considerable stress as many ports have reached their bonding capacity, and self-generated revenue is becoming harder to sustain in the current economic environment. Important additional capital funding for port infrastructure comes from other government sources, such as the Louisiana Department of Transportation and Development's (DOTD) Port Construction and Development Priority Program, Louisiana DOTD Capital Outlay Plan, occasional grants from the Louisiana Department of Economic Development, and some federal funding sources, such as Homeland Security grants and the Transportation Investment Generating Economic Recovery Discretionary (TIGER) grants. Without these supplemental funds, most Louisiana ports are unable to undertake critical port development projects. In response, some ports are seeking to partner with their terminal operators and tenants to make capital improvements in return for reduced lease rates.

Louisiana's ports are vital to the local, state and national economies. In 2012, a comprehensive economic study indicated that the combined economic impact of Louisiana ports, providers of port and vessel services, businesses operating within the ports, and cruise ship operations are almost 73,000 jobs, \$3.961 billion in personal earnings, and state and local tax collections, which are amounting to \$517 million, annually. Port activity creates and supports directly about 4% of the jobs in Louisiana.



CONDITION AND MANAGEMENT

Capacity ↓ Down from 2012

Most ports that handle a high volume of business and anticipate even more growth feel that their current capacity will be maximized in the next five years. Mid-sized ports that are not as diversified and subject to fluctuations in market demands believe their capacity is currently good for the next ten years. However, some ports have experienced growth that outpaced their existing facilities and are expecting capacity limitations as early as 2017. Smaller ports that have not had an opportunity to invest in new facilities are also concerned that without funding now and in the future, they, too, will face limitations beginning in 2017.

Condition ↓ Down from 2012

Most major ports can identify some major rehabilitation needed on 25% or less of their infrastructure. For those ports struggling with funding, it is more likely that needed major rehabilitation will be deferred at their facilities. Rehabilitation includes upgrading facilities to implement new technologies, increase energy efficiency, accommodate new cargo requirements, and improve operations.

Operation and Maintenance ↓ Down from 2012

With funding sources limited, maintenance of aging infrastructure is essential to operations and safety. While most ports indicate they have routine preventative maintenance programs and periodic inspection programs to identify, budget, and schedule repairs, they acknowledge that the amount of funds budgeted is less than what is needed. A few ports are only able to address infrastructure maintenance when operational problems or non-compliance violations are reported.

Public Safety ↔ Same as 2012

Public safety is a team effort across ports and waterway stakeholders, which includes vessel operators, dock owners, and government agencies having jurisdiction, such as the USACE and U.S. Coast Guard. Wherever the public can access a waterway, there is also risk. Port responses varied from fair to excellent regarding their safety records. Because navigation and port infrastructure along the lower Mississippi River is so critical to the nation, five ports formed the coalition, known as the Lower Mississippi River Port-Wide Strategic Council, which expended \$29 million in federal funds between 2008 and 2013, specifically for maritime security improvements, training, and equipment.

FUNDING AND FUTURE NEEDS

Louisiana has been consistently ranked nationally as one of the top two states in tonnage of waterborne imports and exports, and the lower Mississippi River is often called the Gateway to the Americas. Louisiana is home to the intersection of the Mississippi River and the Intracoastal Waterway, where some 97% of all United States' tonnage flows. Exports from Canada and 28 states move down the Mississippi River, and 56% of U.S. grain exports travel through Louisiana ports. The coastal and shallow-draft ports provide a vital role in the nation's oil and gas industry, as Louisiana is the nation's second largest producer of natural gas and the third largest producer of crude oil. Three deep-draft ports on the lower Mississippi River, South Louisiana, Greater Baton Rouge, and New Orleans, were ranked among the top four U.S. ports in terms of tonnage in 2015 by the USACE. For 2016, the U.S. Department of Transportation listed the ports of Lake Charles, New Orleans, Plaquemines, and South Louisiana among the



nation's 25 top ports by tonnage (TEU and Dry Bulk). Louisiana's ports are vital to the local, state and national economies. Also, the Gulf of Mexico accounts for more than 90% of U.S. offshore oil and gas production.

Funding ↓ Down from 2012

Many ports indicated they have had very little funding to address their needs over the past five years. After receiving approval of projects submitted under the Port Construction and Priority Development Program, several ports are still awaiting funding. The Louisiana DOTD had provided \$81.5 million to ports from 2009 through 2012. That increased to \$98.5 million for the period between 2013 and 2016. For many smaller ports, providing a required match is problematic. One deep-river port on the Mississippi River received a \$16.7 million TIGER grant for a \$25 million intermodal rail facility that was completed in 2016.

Future Needs ↑ Up from 2012

The majority of ports have identified future funding sources, such as private-public partnerships, that are likely to fund their infrastructure needs of at least 25%. Many ports cannot acquire even that little amount of funding. In 2016, the Louisiana legislature increased the annual funding for the Port Construction and Priority Development Program to \$39.4 million, but not the \$50 million recommendation in the 2012 ASCE Report Card for Louisiana ports.

Resilience ↓ Down from 2012

Louisiana has experienced many natural hazards, from Category 5 hurricanes and tornadoes to record rainfalls and floods, especially those in low lying coastal areas and inland waterways. Ports have also experienced major hazardous material spills from marine accidents in the waterways and the Deep-Water Horizon oil spill along the Gulf Coast. The majority of ports responded that there have been lessons learned from past recovery and restoration of operations. The major ports have formal, written hazard mitigation plans, disaster recovery plans, port security plans, resiliency plans, and they provide staff training for disasters. For example, in the aftermath of the unprecedented wrath of Hurricane Katrina in 2005, the Port of New Orleans was able to berth and handle container cargo just two weeks later.

Innovation ↓ Down from 2012

Considering the current process to plan, design, perform major maintenance and repairs, and build new port infrastructure, some of the ports have looked to alternative means of project delivery methods when state and federal laws allow, and they reported incorporating new technologies and sustainability practices. This is more difficult for the smaller ports facing funding issues, as they are operating at a smaller scale. As an example of using alternative means, the Port of New Orleans built a state-of-the art cold storage facility by using the new Louisiana design-build legislation created to expedite construction after Hurricane Katrina. This was the first port project in the state to use an alternative to the traditional design-bid-build for public works projects in the state.



LET'S RAISE THE GRADE

- Increase the Louisiana Port Construction and Development Priority Program's annual funding from \$39.4 million to \$50 million.
- Increase or eliminate the annual cap for each port that has project(s) already approved for funding.

FIND OUT MORE

The following sources were utilized in developing this report:

- Louisiana DOTD, Status Report on the Port Construction and Development Program Priority Program, 23rd Annual Report February 2016.
- USDOT, Bureau of Transportation Statistics, Port Performance Freight Statistics Program, Annual Report to Congress 2016.
- USACE, Planning Center of Expertise for Inland Navigation, Louisiana, 2015 <http://outreach.lrh.usace.army.mil/states/LA/Louisiana%202015.pdf>
- The Economic Impact of the Ports of Louisiana, Dr. James A. Richardson, March 2012
- Report on State Financial Assistance for Capital Improvements at Public Ports in the United States, for the Ports Association of Louisiana by the Port Professionals Group, November 2009.
- Ports Association of Louisiana Strategic Economic Development Plan, Summary Report by the University of New Orleans and Norbridge and Shaw Environmental & Infrastructure, Inc. February 2009.
- Ports Association of Louisiana 5-Year Capital Improvement Plan 2007-2011 by Shaw Environmental & Infrastructure, Inc. January 2007.
- USACE, An Overview of the U.S. Inland Waterway System, Navigation Economic Technology Research Program, November 1, 2005.
- Ports Association of Louisiana and the Maritime Industry, Timothy P. Ryan, University of New Orleans, August 2002.
- Ports Association of Louisiana, Louisiana Ports Deliver PowerPoint, 2002 <http://portsoflouisiana.org/document-library/>



WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S ROADS

Louisiana has more than 61,000 miles of roadways, of which 18,359 (30%) miles are state-owned and maintained by the Louisiana Department of Transportation and Development (DOTD). These roads are primarily funded by a 16 cents per gallon tax on gasoline and diesel fuel which generated approximately \$500 million of revenue in 2016. Louisiana has not increased its motor fuels tax since it was established in 1984, and inflation has cut its value by more than half. Louisiana also charges an additional four cents per gallon tax on gasoline and diesel fuels to fund bond payments for the Louisiana Transportation Infrastructure Model for Economic Development (TIMED) program, which has constructed 14 out of 16 specific projects to date. Two of the uncompleted projects remain unfunded at this time. In addition, unclaimed property monies in the amount of \$15 million per year are being dedicated to the completion of I-49 in north Louisiana. Louisiana also receives approximately \$677 million per year in federal funds that the state must provide matching funds for.

According to the 2015 TTI Urban Mobility Scorecard, New Orleans is ranked 54th (39,159,000 hours of delay) and Baton Rouge is ranked 38th (23,163,000 hours of delay) in the nation for travel delays. In addition, drivers in Lafayette experience 26 hours of delay per year per automobile, and drivers in Alexandria experience 27 hours of delay per year per automobile. According to Federal Highway Administration Statistics, vehicle miles traveled (VMT) in Louisiana increased from 45.4 billion VMT in 2010 to 47.9 billion VMT in 2014, a 5% increase.

CONDITION AND MANAGEMENT

Capacity ↓ Down from 2012

The capacity of Louisiana's highways continues to be stressed in major metropolitan areas. Roadway capacity was analyzed for eight Metropolitan Planning Organizations (MPOs) in Louisiana. While a few of the more lower density areas, such as Houma, Alexandria, and Shreveport had a satisfactory level of capacity, the other metropolitan areas, such as Baton Rouge, Lafayette and New Orleans/ North Shore all have major capacity/congestion issues. The Baton Rouge area has seen unprecedented growth over the past 15 years, partially due to the influx of residents following Hurricane Katrina.

As documented in the 2015 TTI Urban Mobility Scorecard, New Orleans was graded as the sixth worst urban area (medium average area for 33 areas) for travel time delay, and Baton Rouge was rated third worst of (medium average area for 33 areas). As an example of the size of the area, Washington DC is considered a very large average area and Orlando, Florida is considered a large average area. Traffic congestion not only creates travel delays for commuters and businesses, but also increases excess fuel consumption and has a negative impact on the state's economy.



I-10 Baton Rouge (Advocate File Photo)

Condition Up from 2012

Roadway condition generally considers the riding surface, geometry, signing, pavement markings and the riding quality of the pavement. This pavement riding quality feature is generally used as the indicator of the overall condition of the road. Pavement roughness is measured and compared to accepted standards that range from very poor to excellent conditions. The pavement condition rating is sometimes simplified to three conditions: poor, fair, or good.

The condition of roadways in Louisiana has slightly improved since the 2012 scorecard. This is due to a one-time influx of federal dollars from the 2009 American Recovery and Reinvestment Act. Driving on roads needing repair costs Louisiana drivers \$6.5 billion per year in additional vehicle repairs, travel delays, traffic crashes, and operating costs (\$1,894 - \$2,466 per motorist in major urban areas). For Louisiana, the roadway systems are divided into four major classifications. Interstate Highway System (IHS), National Highway System (NHS), State Highway system (SHS), and Regional Highway System (RHS). While the total number of miles is lowest for the Interstate system, the total vehicle miles is higher for the IHS; therefore, the importance of roadway conditions is more critical for the heavier traveled systems. Surface conditions for Louisiana roadways is measured and reported by the DOTD. The reported conditions are summarized in Table 1 below. The overall condition of the IHS, SHS, and RHS roadways improved from 2009 to 2015, and the NHS remained relatively the same.

TABLE 1: SURFACE CONDITIONS ASSESSMENT FOR LOUISIANA ROADS

Condition / System	IHS (1620 miles)			NHS (3016 miles)			SHS (6298 miles)			RHS (7425 miles)		
	2009	2015	Diff.	2009	2015	Diff.	2009	2015	Diff.	2009	2015	Diff.
Poor*	4.4%	1.9%	-2.5%	5.7%	6.7%	1.0%	4.9%	3.0%	-1.9%	13.0%	10.5%	-2.5%
Fair*	35.1%	27.0%	-8.1%	33.0%	30.9%	-2.1%	35.8%	29.5%	-6.3%	42.8%	37.7%	-5.1%
* A negative difference for Poor and Fair is an improvement over 2009												
Good**	22.8%	21.5%	-1.3%	32.2%	35.0%	2.8%	35.8%	42.7%	6.9%	28.8%	33.0%	4.2%
Excellent**	37.2%	49.4%	12.2%	27.0%	24.0%	-3.0%	22.9%	24.0%	1.1%	12.4%	16.8%	4.4%
** A positive difference for Good and Excellent is an improvement over 2009												
Green shade means conditions improved; Purple shade means conditions regressed												



Operations & Maintenance ↓ Down from 2012

Operations and Maintenance of the state highway system includes condition of the surface and shoulders, drainage, sweeping, striping, Intelligent Transportation Systems (ITS), rest areas, mowing, and litter control. Louisiana's maintenance budget for these items increased from \$48.7 million in 2012/2013 to \$49.2 million in 2016/2017. Roadway contract maintenance funds decreased from \$10.7 million in 2012/2013 to \$8.1 million in 2016/2017. Louisiana ranks 6th nationally (6th lowest) in maintenance disbursements per highway mile (\$7,739 spent per mile on maintenance).

Public Safety ↓ Down from 2012

DOTD has increased funding on safety projects and programs from \$65 million in 2012/2013 to \$83.2 million for 2015/2016, which is a 28% increase. A comparison of Louisiana's safety funding in 2012-2013 to 2015-2016 is presented in Table 2. A corresponding decrease in the Louisiana Fatality Rate from 888 fatalities in 2010 ([1.96/Million](#) Vehicle Miles Traveled) to 712 fatalities ([1.51/MVMT](#)) in 2014 is a direct reflection on the additional funds invested in improving the safety of Louisiana's highways. A statewide effort has been implemented to install median cable barrier and improve pavement markings and signage at the most critical locations throughout the state. While the effort to improve safety is commendable, Louisiana remains far worse than the national average for fatalities. Based on the National Highway Traffic Safety Administration (NHTSA), the national average rate for fatalities in 2015 was 1.12. This places Louisiana about 35% higher than the national average.

TABLE 2 : LOUISIANA'S SAFETY FUNDING (IN MILLIONS)

SAFETY FUNDING	2012 - 2013	2015 - 2016	DIFFERENCE
Highway Program	\$49.4	\$60.1	22%
Local Road Safety	\$3.0	\$3.0	N/A
Safe Roads to School	\$2.6	\$2.7	4%
Railroad Grade Separations	\$1.0	\$8.4	740%
Railroad Crossing Upgrades	\$9.0	\$9.0	N/A
Total Yearly Funding	\$65.0	\$83.2	28%

FUNDING AND FUTURE NEEDS

Funding ↔ Same as 2012

The state gasoline tax of 20 cents/gallon (4 c cents TIMED Program and 16 cents regular program) has not changed since 1989 and is one of the nation's lowest state gas tax rates. Due to inflation, the 16 cents is worth approximately 7 c cents in current dollars, a huge loss in buying power.



Prospects for future funding increases show some promise. A statewide task force, established by Governor Edwards in 2016, has developed a plan to raise nearly \$700 Million per year for transportation funding. Tentative recommendations have included a 10-cent to 20-cent increase in the state gas tax, indexing the tax to a cost of living factor, additional truck registration fees and various other items. The real test will be in 2017 and possibly in future fiscal sessions, when the state legislature will be asked to consider implementation of the task force recommendations. If additional transportation funds are not authorized in 2017, the buying power of the current sales tax will continue to dwindle, future projects will remain unfunded, and DOTD will not be able to match future federal funds. Also, funding for Priority A and Priority B Megaprojects identified in the Louisiana Statewide Plan (2015) has to be obtained.

Future Needs Up from 2012

Louisiana currently has a \$13 Billion backlog in needed transportation funding (\$10.1 Billion for Roads). A few capacity improvement projects have been completed on Interstates I-10 (Lake Charles, New Orleans and Baton Rouge) and I-12 (Livingston Parish), and some segments of I-49 in Lafayette and North Louisiana are currently under construction; however, major segments of these roadways remain with future need for additional capacity. A study project is in progress on how to construct I-49 in Lafayette; however, design and construction funding has not been identified. The MPOs throughout the state have identified several major capacity improvement projects and are seeking community support, but funding of these projects remains unknown.

Resilience Same as 2012

The resilience of Louisiana's roadway network had never been tested before as it was in 2016. Major flooding events in both the spring and summer of 2016 caused road closures on numerous interstates and major roadway networks. Portions of I-20, I-10, I-12, I-49 and I-55, as well as Airline Highway (US 61) and other heavily traveled roadways, created the need to implement alternative routing throughout the state. By utilizing LA Route 190, US 61 and other parallel routes, the impact to the traveling public was minimized during the flood events.

As a part of the roadway redundancy, Louisiana has multiple major river crossings that provide redundancy and alternative routes in the event of a major catastrophe. In the past 25 years, two new Mississippi River crossings were constructed and the US 90 Huey Long Bridge was widened. These improvements have enhanced the overall redundancy of the roadway network.

Innovation Same as 2012

DOTD has implemented several programs for improving public travel. DOTD has implemented a 511-system available by computer and smart phone, and ITS systems have been expanding, and specific locations have been modified with systems such as ramp metering. DOTD has also partnered with Waze to share data between the ITS system and Waze users. DOTD has also utilized Design-Build construction processes on selected projects, allowing for faster project delivery. In addition, the Public-Private Partnership (P3) method of delivery has been authorized in Louisiana and allows DOTD the possibility of accelerating completion of high-value projects at minimal initial cost to taxpayers; however, no P3 projects have been identified to date.



ROADS



LET'S RAISE THE GRADE

- Significantly reduce the \$10.1 Billion of Roadway Backlog funding for the State.
- Secure funding for Priority A and Priority B Megaprojects identified in the Louisiana Statewide Transportation Plan (2015).
- Continue the Highway Safety Improvement Program successes by investing in projects that will reduce injuries and fatalities.
- Increase the state gas tax to restore purchasing power and index it to inflation.

FIND OUT MORE

The following Sources were utilized in developing this report:

- TTI 2015 Urban Mobility Scorecard, Texas A&M Transportation Institute
<https://mobility.tamu.edu/ums/>
- Metropolitan Planning Organizations of Louisiana
<http://wwwapps.dotd.la.gov/administration/dotdaz/definition.aspx?termID=265>
- DOTD Report on Pavement Conditions 2009-2015
(Internal Report available from DOTD)
- DOTD Transportation Summary Funding 2012-2016
(Internal Report available from DOTD)
- The Advocate – Official: Louisiana Ignored “Truth” of Transportation Needs Too Long, Now Must Pay Up. November 17, 2016
http://www.theadvocate.com/baton_rouge/news/article_fa9ee982-ac3d-11e6-b5b5-e3ab36327190.html?sr_source=lift_amplify
- Louisiana Highway Safety Improvement Program 2015 Annual Report (Internal Report available from DOTD)



ROADS



- USDOT National Highway Traffic Safety Administration, 2015 Motor Vehicle Crashes Overview
<https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812318>
- DOTD State Highway and Bridge Needs 2015
(Internal Report available from DOTD)
- Louisiana Statewide Transportation Plan July 2015
<http://www.dotd.la.gov/study>
- DOTD Vulnerability Assessment Report March 2004
(Internal Report available from DOTD)
- DOTD Website
<http://wwwsp.dotd.la.gov/Pages/default.aspx>
- TRIP - Louisiana Transportation by the Numbers: Meeting the State's Need for Safe, Smooth and Efficient Mobility; March 2017
http://www.tripnet.org/docs/LA_Transportation_by_the_Numbers_TRIP_Report_March_2017.pdf



SOLID WASTE

GRADE: C+

WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S SOLID WASTE FACILITIES

Louisiana generates over 5.9 million tons of municipal solid waste (MSW) per year. Recycling and other waste diversion measures recover approximately 3% of the waste, and the remainder is disposed of in landfills. There are 25 permitted landfills for non-hazardous industrial and municipal solid waste, Type I and Type II, respectively. They receive waste generated off-site, and there are another 30 permitted Type III construction and demolition debris (C&D) landfills in the state. This evaluation does not consider the 16 landfills at private industrial facilities, which are permitted to receive only waste generated on-site.

Solid waste disposal is a vital and necessary local government public health function, and municipalities and parishes need to be aware of the capacity of local landfills to continue to serve as the repository of MSW. Planning, design, permitting, and construction of new landfills can take as much as 10 years and can cost millions of dollars. The long lead time and high cost, both monetarily and politically, of developing new solid waste disposal facilities places a premium on extending the life of existing landfills.

CONDITION AND MANAGEMENT

Capacity ↔ Same as 2012

Louisiana's solid waste landfills have the capacity to receive an additional 246 million tons of Type I/II solid waste. Considering the current rate of disposal, these landfills will provide capacity for the next 41 years. Similarly, permitted Type III landfills have sufficient capacity to provide for the next 50 years of C&D debris disposal statewide.

However, natural disasters, such as a major hurricane or the unprecedented rainfall experienced by south and central Louisiana in August 2016, described as a 1,000-year rain event, can cause a significant increase in the amount of MSW or C&D waste in a given year. Louisiana Department of Environmental Quality (LDEQ) estimates that this event will generate 4 million cubic yards of waste. Curbside separation, recycling, composting, diversion, or other volume reduction of the waste is expected to reduce this to 2 million cubic yards of C&D being disposed in Type III landfills, which is significant, but it still equates to approximately an additional half year's volume.



Curbside recycling is available in most Louisiana major cities and parishes. Curbside recycling removes approximately 3% of the MSW waste stream from landfills. Nationwide, the percentage is 34% according to USEPA (2014). Diversion programs that include separate collection and composting of vegetation can increase diversion significantly. Increasing the diversion of solid waste through recycling, composting, or beneficial reuse of waste materials to 25% (still less than the national average) would extend the current statewide landfill capacity by over 10 years.

Condition, O&M, and Public Safety ↔ Same as 2012

Type I/II landfills collect groundwater samples from multiple wells twice, annually, for detection monitoring. Occasionally, sample results indicate potential groundwater contamination. In these instances, alternate sources are identified or assessment monitoring (a more intense level of monitoring) is initiated. Five landfills (20%) have detected contaminants, which require assessment monitoring to ensure that public groundwater sources are not impacted.

Fires or other unauthorized discharges have been reported at six landfills during the 2013-2014 and 2014-2015 reporting years. These can be caused by inadequate maintenance, operator error, careless actions by landfill personnel or truck drivers, or other reasons. LDEQ has investigated nine landfills for citizens' complaints in the past three years, and eight landfills have been issued compliance orders by LDEQ within the past three years.

FUNDING AND FUTURE NEEDS

Funding ↔ Same as 2012

Solid waste management infrastructure is funded by a mixture of public and private funds. Some landfills are publicly owned and operated; some are publicly owned but operated by private contractors; many others are privately owned and operated. Private landfills are funded by tipping fees, the fees collected from waste generators for disposal. Public landfills may be funded by a combination of tipping fees and public taxes.

Waste tires present a significant fire hazard in landfills and whole tires tend to "float" to the surface through daily cover. LDEQ prohibits waste tire disposal in landfills and manages a Waste Tire Trust Fund which is supported by a \$2 fee collected on new tire sales. LDEQ permits six contractors to collect, process, and recycle waste tires with designated reimbursement from the trust fund. However, for several years, trust fund payments have exceeded collections and payments to permitted contractors have been reduced.

LDEQ regulations require Type I/II landfills to estimate the cost of closure (final cover installation) and post-closure maintenance for 30 years, which can total millions of dollars. Type III landfills are also required to estimate the cost of closure and post-closure; however, the post closure period for these facilities is three years. These estimates are based on a third party having to close the largest area that will require final cover at one time. All landfills must provide a mechanism, such as a bond or trust fund, to ensure the funds for closure are available in the event of an unexpected closure. Landfills permitted by local or parish government have an option to guarantee the closure costs with a local government test, provided sufficient assets exist. LDEQ is currently reviewing the closure and post-closure estimates and associated financial assurance mechanisms for all solid waste facilities to ensure compliance with the regulations and permits.



Most local governments prudently save dedicated funds for the closure/post-closure costs, but not all. The total estimated closure cost of the 17 publicly-owned landfills is over \$158 million. The total funds saved, dedicated, or earmarked for this purpose collectively is just over \$60 million. Four local governments have no funds saved for their landfill closure/post-closure maintenance. These cities/parishes comply with the regulation through either the local government financial test or by requiring the landfill-operating contractor to provide a bond. Failure to provide these funds will place a burden on future generations to pay this expense related to current disposal activities.

Future Needs ↔ Same as 2012

Landfills are very expensive to develop and permit. Many communities and private companies are developing alternatives to landfills for solid waste management. These facilities utilize a number of emerging conversion technologies to process MSW and recover recyclable materials, energy, or high-value products like methanol. The costs of new facilities may be prohibitive, and investments expanding curbside recycling and extending the useful life of current landfills may be the less expensive option. A comprehensive local solid waste management plan which considers all options for MSW collection, sorting, processing, recovery and disposal is needed to plan for cost-effective future solid waste management.

Resilience ↓ Down from 2012

In addition to the immediate impact on landfill capacity, natural disasters can also limit access to some landfills through flooding or road damage. Access to alternative landfills within a reasonable haul distance can facilitate rapid response to natural disaster clean-up and return to normalcy.

All parishes and major municipalities have debris management plans in anticipation of natural disasters. LDEQ requires pre-approval of temporary debris management sites within parishes and municipalities. These sites can be permitted to receive debris, sort and process debris, reduce volume, recover recyclable materials, and load-out debris residue for disposal. A total of 348 temporary debris management sites in 49 parishes have been approved by LDEQ. These sites can be activated by the parish by notification after a declaration of emergency.

Innovation ↔ Same as 2012

LDEQ regulations permit the use of alternative liners, daily covers, and final covers if the alternative is proven to be equivalent to the regulatory standards. LDEQ reviews the proposed alternative liners and covers during the permit application process. The alternatives may reduce installation costs, increase capacity, or provide another advantage over the regulatory standard. All Type I/II landfills that receive waste generated off-site utilize either an alternative liner, daily cover, or final cover.

Most landfills also divert suitable waste materials for reuse within the landfill for road bed, daily covers, drainage media, or other construction materials within the lined disposal area. Some landfills are permitted to sort and recover recyclable materials to further extend landfill capacity.



LET'S RAISE THE GRADE

- Provide for effective curbside recycling, composting of vegetation, or other waste diversion in all major municipalities and parishes and set the goal to divert 25% of MSW from Type I/II landfills within 10 years. This would extend the current landfill capacity to 56 years.
- Parishes and municipalities should provide funds for the closure and post-closure care of all public landfills. Increase annual dedicated funding to ensure that future generations are not burdened with these costs associated with current disposal practices.
- Increase funding to the Waste Tire Trust Fund to ensure that permitted contractors receive full payment for the collection, processing, and beneficial reuse of waste tires.
- Local governments should initiate comprehensive solid waste management planning to incorporate emerging technologies at the appropriate time. Given the long lead times and significant investments required, active planning, and monitoring of new technologies will reduce future solid waste management costs.
- Louisiana should consider a program similar to the Recycled Materials Resource Center at the University of Wisconsin to research potential beneficial reuse of waste materials and decrease waste disposal.

FIND OUT MORE

The following sources were utilized in developing this report:

- USEPA, Advancing Sustainable Materials Management: 2014 Fact Sheet, November, 2016
- LDEQ, Summary of 2014 Annual Recycling Reports, December, 2015
- LDEQ, Annual Certifications of Compliance, 2014-2015 Reporting Year
- Recycled Materials Resource Center website: <http://rmrc.wisc.edu/>



WHAT YOU SHOULD KNOW ABOUT LOUISIANA'S WASTE-WATER TREATMENT AND COLLECTION SYSTEMS

Wastewater in Louisiana is generated from households, commercial businesses, and industry. The Louisiana Department of Environmental Quality (LDEQ) has the responsibility to monitor waterways to assure they meet federal water quality standards. The 2017 Report Card for Louisiana's Infrastructure is based on the 2014 Louisiana Water Quality Inventory, which indicates 477 of 512 (93%) are impaired. Only 23 (less than 5%) are impaired from municipal point discharges (treatment plants). There are 86 (17%) impaired sub segments from on-site individual treatment units and septic tanks.

CONDITION AND MANAGEMENT

Capacity Up from 2012

The capacity of Louisiana's wastewater systems has increased since 2010 due to plant expansions and upgrades. The population has only increased from 4.54 million to 4.67 million from 2010 to 2015 or about 3%. Some of this capacity increase is caused by the increase in individual treatment systems in the rapidly developing parishes in the state. The Louisiana Department of Health has issued over 153,000 individual treatment system permits.

Based on the number of municipalities that have been under state orders to improve the systems' dry weather and wet weather capacities, wastewater systems conditions have improved since 2012. Funding for major metropolitan areas has increased by approximately \$1.5 billion over the past five years. This is in due partly to consent decrees entered by the municipalities with the EPA. As a result, several sanitary sewer overflow elimination programs are underway across the state. While the major municipal systems are improving, the number of problems from failing package treatment plants and individual on-site treatment systems has increased since 2012.

Operations & Maintenance Up from 2012

Operations and maintenance of the municipal wastewater treatment systems have improved since 2012 due to the capital expenditures made to upgrade many of the systems with new equipment. Also, the number of operators is currently adequate to effectively manage the plants. A problem with the individual on-site systems and package plants that do not require a mandatory maintenance program still exists. These small units continue to be a major problem that will need to be addressed.



Public Safety ↔ Same as 2012

Louisiana has not had a significant number of illnesses or deaths related to the treated discharges for the state's wastewater treatment systems. Although there are 478 of the 512 stream segments that are impaired by the Environmental Protection Agency (EPA) standards in the state, these do not pose a significant health threat. Some of the impaired segments are a result of residual effect of the Deepwater Horizon oil spill from 2010.

FUNDING AND FUTURE NEEDS

Funding ↑ Up from 2012

Future Needs ↔ Same as 2012

More than \$800 million from the Louisiana State Revolving Loan Program has been invested by major municipalities to upgrade their wastewater treatment and collection systems over the past 5 years. Other sources of Federal funding have been limited. For example, over the next 5 years, only \$4 million per year are programmed for the community block grant program. The larger problem that is developing is with the proliferation in some parishes of high-density individual on-site treatment units that are not capable of treating wastewater to the same consistent standards as larger centralized collection and treatment systems.

RESILIENCE AND INNOVATION

Resilience ↑ Up from 2012

The resilience of Louisiana's wastewater treatment and collection systems is improving only slightly for two reasons: Significant funds are being used to upgrade older systems, and the newer materials of construction have longer life expectancies. The use of stainless steel and aluminum has extended the lives of metal parts in structural and mechanical systems, and plastics and fiber resin systems have extended the life of many piping systems.

Innovation ↔ Same as 2012

The upgrades to most of the treatment systems over the past have been with traditional systems that have proven effective for many years. There are newer technologies that need to be explored. As examples, recycling wastewater by using advanced treatment technology, and providing constructed wetlands by using natural habitat have not been applied widely in the state. Advances in trenchless technology for piping systems should also be researched and used more prolifically, as the state advances into repairing its aging systems.



LET'S RAISE THE GRADE

- Increased investment from all levels of government and the private sector, to replace older treatment, and collection systems including additional federal funding for the State Revolving Fund Loan program.
- State and local funding programs need to be developed for rapidly growing parishes with individual and package treatment systems to construct central collection and treatment systems to improve overall discharge quality.
- Provide the LDEQ with adequate staff and funding to provide more intensive monitoring of stream quality to assure the highest level of use for streams and lakes within the state. Provide programs to fund alternative projects to address the large quantity of impaired streams that are not the result of wastewater discharges.
- Develop more programs to train new operators and provide continuing education for all operators at facilities across the state so attendance can be accommodated within reasonable distances for all communities.

FIND OUT MORE

The following Sources were utilized in developing this report:

- Onsite Wastewater Program, Louisiana Department of Health:
<http://dhh.louisiana.gov/index.cfm/page/627>
- 2010 Louisiana Water Quality Inventory: Integrated Report Fulfilling Requirements of the Federal Clean Water Act, Sections 305(b) and 303(d) by Louisiana Department of Environmental Quality, Office of Environmental Services, Water Permits Division.
- 2014 Louisiana Water Quality Inventory: Integrated Report Fulfilling Requirements of the Federal Clean Water Act, Sections 305(b) and 303(d) by Louisiana Department of Environmental Quality, Office of Environmental Services, Water Permits Division.
- United States Environmental Protection Agency, Clean Watersheds Needs Survey 2008, Report to Congress.
- United States Environmental Protection Agency, Clean Watersheds Needs Survey 2012, Report to Congress.