This product is part of the RAND Corporation technical report series. Reports may include research findings on a specific topic that is limited in scope; present discussions of the methodology employed in research; provide literature reviews, survey instruments, modeling exercises, guidelines for practitioners and research professionals, and supporting documentation; or deliver preliminary findings. All RAND reports undergo rigorous peer review to ensure that they meet high standards for research quality and objectivity.
TECHNICAL REPORT

Financing the Operation and Maintenance Costs of Hurricane Protection Infrastructure

Options for the State of Louisiana

Trey Miller

Environment, Energy, and Economic Development Program
This project was sponsored by Louisiana’s Coastal Protection and Restoration Authority and was conducted under the joint auspices of RAND Environment, Energy, and Economic Development and the RAND Gulf States Policy Institute.
Executive Summary

This report analyzes the fiscal capacity of local levee districts in southern Louisiana to shoulder the burden of operating and maintaining the Hurricane and Storm Damage Risk Reduction System (HSDRRS) and other key hurricane protection infrastructure currently under construction by the U.S. Army Corps of Engineers (USACE). It specifically focuses on operation and maintenance (O&M) costs, assuming that costs associated with major repairs and levee lifts will not be borne by levee districts. It also discusses some approaches that other government agencies responsible for operating and maintaining flood and hurricane protection infrastructure are using to generate revenue to cover those costs.

The report discusses the methodology used to project the O&M costs associated with hurricane protection infrastructure. It provides O&M cost estimates for each newly constructed piece of the HSDRRS and estimates the total O&M costs to be borne by eight major levee districts within the HSDRRS. Some of these estimates differ from estimates based on cost-plus engineering estimates because they are based on historical expenditures by levee districts to maintain existing infrastructure. The report then discusses our methodology for projecting levee district budget revenues and budget balances through 2016. The report concludes with a discussion of some options that other states have used to generate revenue for the O&M of levees and hurricane protection infrastructure.

Projections of O&M Costs of Hurricane Protection Infrastructure

We combined two approaches to project the incremental O&M costs of the HSDRRS. The vast majority of incremental O&M costs stems from large, newly constructed projects with no precedent in the pre–Hurricane Katrina system.¹ These include the Gulf Intracoastal Waterway West Closure Complex (WCC) and the Seabrook Control Structure. For these projects, we used cost-plus engineering-based O&M cost estimates developed by the USACE. These estimates derive O&M costs by defining a 50-year O&M schedule; assigning specific monetary costs for each O&M function based on assumptions concerning labor, materials, and overhead costs; and taking the average annual cost over the 50-year project life cycle. To estimate the O&M costs that will be borne by each levee district, we assigned

¹ Hurricane Katrina made its second landfall along the Louisiana coast on August 29, 2005.
each piece of this new infrastructure to a specific levee district and summed the projected O&M costs of all pieces of infrastructure that will ultimately be assigned to that district. The remaining incremental O&M costs associated with the HSDRRS stem from additions of or major modifications to hurricane protection infrastructure similar to what was in place prior to Hurricane Katrina. Examples of such typical projects include raising existing levees or constructing new gates and pump stations similar to those that existed prior to Hurricane Katrina.\textsuperscript{2} To estimate these incremental costs, we employed historical data on O&M expenditures and pre-Katrina hurricane protection infrastructure by levee district to estimate the incremental cost of operating and maintaining typical pieces of hurricane protection infrastructure: levees, floodgates, and pump stations. To estimate maintenance costs for these types of infrastructure, we measured levees in terms of area (acres) and counted the numbers of floodgates and pump stations. We then used an econometric model employing historical cost data to estimate the incremental cost of operating and maintaining an additional acre of levee right-of-way, floodgate, and pump station, respectively. To estimate the additional costs of maintaining and operating the new infrastructure being built within the state of Louisiana, we applied these estimates to data on the numbers of new acres of levee, floodgates, and pump stations being built within the HSDRRS.

To estimate the total O&M costs associated with the HSDRRS, we added the incremental O&M costs obtained from the methods described above to baseline O&M estimates derived by projecting forward actual annual historical O&M expenditures on the pre-Katrina system. Approximately 72 percent of total O&M costs associated with the HSDRRS stems from infrastructure that was in place prior to Hurricane Katrina.

Assignment of O&M responsibilities for HSDRRS infrastructure spanning levee district boundaries or offering protection to multiple jurisdictions is a matter of ongoing discussion in southern Louisiana. In many cases, it is still unclear how the O&M responsibilities for such infrastructure will be shared by jurisdictions. The O&M estimates by levee district presented in this report include only those costs associated with infrastructure that is wholly contained within a levee district’s boundaries. As such, they represent a lower bound for a levee district’s total expected O&M costs. We identified three major pieces of infrastructure in the West Bank that either span the boundaries of West Jefferson Levee District (WJLD) or provide significant protection to portions of Southeast Louisiana Flood Protection Authority (SLFPA) West: the WCC and the Eastern and Western Tie-Ins. The total cost to operate and

\textsuperscript{2} While the number of HSDRRS projects with modifications to or construction of typical projects far exceeds the number of unprecedented projects, the O&M costs associated with each typical project is quite low relative to that of unprecedented projects. Thus, the vast majority of incremental O&M costs stem from unprecedented projects.
maintain this infrastructure is estimated at $3 million to $4 million annually. A key goal for CPRA and other stakeholders will be to determine the allocation of O&M responsibilities for these major pieces of infrastructure.

According to our projections, some districts will bear a larger share of the incremental O&M burden associated with the HSDRRS than others. We project that the O&M costs for Orleans Levee District will increase by $1.9 million to $2.8 million annually once the USACE has transferred responsibility for the new infrastructure associated with the HSDRRS. In contrast, we project that East Jefferson Levee District’s O&M costs will increase by just $20,000 annually.

Projected Budget Balances, by Levee District

We use our cost estimates to derive projections of budget balances in 2016 by levee district. Our projections assume the following:

1. The HSDRRS will be complete by 2016, and levee districts will be fully responsible for the O&M costs of the system.
2. O&M costs per acre of levee, per floodgate, and per pump will not rise more rapidly than the rate of inflation, i.e., they will be constant in inflation-adjusted terms.
3. Ad valorem (property) tax revenues will stagnate in inflation-adjusted terms between 2009 and 2016. We also investigate a scenario in which these revenues increase in inflation-adjusted terms by 2 percent annually between 2009 and 2016.

We find considerable variance in projected budget balances across levee districts, with many levee districts enjoying surpluses. Although Lake Borgne is projected to have a $2 million deficit by 2016, Orleans and East Jefferson Levee Districts are projected to have $8 million and $4 million surpluses, respectively, under the scenario that ad valorem revenues remain flat in constant prices. Assuming that none of the O&M functions for the district boundary–spanning pieces of infrastructure in the West Bank will fall on WJLD, the district will roughly break even in 2016. However, if significant portions of O&M responsibilities for the WCC and/or the Eastern and Western Tie-Ins fall on WJLD, then WJLD and SLFPA West could both face budget shortfalls unless additional revenues are raised. Overall, under all scenarios, the total of all projected surpluses exceeds that of projected deficits, even when the district boundary–spanning pieces of infrastructure are included in SLFPA West’s budget, suggesting that there may be scope for revenue-sharing across levee districts.
Approaches That Other States Have Tried for Financing Levee and Hurricane Protection Infrastructure

Other states’ approaches for financing the O&M costs of levee and hurricane protection infrastructure fall into three categories. First, we discuss options related to states’ use of land in the levee right-of-way. Approaches used in other states, not necessarily appropriate in a Louisiana setting, include

1. strategic leasing of prime levee right-of-way to casino and other commercial developers
2. leasing of levee right-of-way for hunting or grazing purposes
3. selling off levee right-of-way and retaining conservation easements
4. leasing levee right-of-way for cell phone towers and billboards
5. developing and charging for the use of recreational facilities with low O&M costs, such as boat ramps and marinas.

We also discuss an option of the federal government paying a share of the O&M costs of the HSDRRS. When interviewing officials responsible for levee maintenance in other states, we learned that the USACE operates and maintains a large share of the flood control infrastructure along waterways deemed navigable by the federal government, including the Gulf and Atlantic Intracoastal Waterways. Some of the larger pieces of the HSDRRS are situated along the Gulf Intracoastal Waterway and, in theory, could be considered a federal responsibility. Further research by legal experts would be required to assess the viability of the USACE sharing in the O&M costs for that infrastructure.

We also discuss options relating to consolidation of and revenue-sharing among levee districts. A number of state governments, including those of Florida and California, play a larger role than the State of Louisiana in funding O&M costs of levees and other flood control infrastructure. Other states, also including Florida, have a formal mechanism in place for revenue-sharing across local levee districts. Given that projected total surpluses may outweigh total deficits, an appropriately designed revenue-sharing mechanism is one potential means of covering deficits in those districts threatened by substantial increases in costs. This mechanism may hold promise for the State of Louisiana.