Transportation Risk and Infrastructure Protection Plan

JUNE 2026









RPC
REGIONAL PLANNING COMMISSION
FOR THE PARISHES OF LOUISIANA
JEFFERSON · ORLEANS · PLAQUEMINES · ST. BERNARD · ST. CHARLES · ST. JOHN THE BAPTIST · ST. TAMMANY · TANGIPAHOA

Regional Planning Commission for Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany, and Tangipahoa Parishes

Contents

Introduction 1

RPC Overview 1

Purpose and Need 3

Role of RPC in Resilience Planning 4

About This Plan 4

Stakeholder Input 6

Defining Resilience 7

Goal & Desired Outcomes 9

Baseline Conditions 10

Regional Overview 10

Key Transportation Infrastructure 12

Regional Resilience Planning 16

Hazards Assessment 19

Risk-Based Vulnerability Assessment 28

Assets Evaluated 28

Assessments and Results 29

Linking Vulnerability Assessments 44

Using the Assessment 46

Recommendations 47

Strategies 52

Priority Projects 57

Investment Plan 58

Implementation 60

Appendix A: Federal Requirement Crosswalk 62

Appendix B: VAST Methodology 64

Asset Data Points 65

Indicator Calculation Methods and Citations 65

Additional Notes 88

Appendix C: Priority Project List 90

Figures

Figure 1: RPC Metropolitan Planning Area 2
Figure 2: Federal-Aid Network (Source: DOTD (2023). Draft Federal-Aid Network.)..... 13
Figure 3: Road and Bridge Points Assessed in VAST 30
Figure 4: Components of Vulnerability 32
Figure 5: Simplified Example of VAST Calculation of Bridge Vulnerability to Storm Surge .. 34
Figure 6: Road Vulnerability to Storm Surge, St. Bernard Parish 36
Figure 7: VAST Road and Bridges that Carry RTA, JP Transit, or SBURT routes..... 45
Figure 8: Elevation Source Coverage for VAST points 67

Tables

Table 1: TRIP Plan Elements and Expected Outcomes 9
Table 2: Hazards Ranked as a High Priority in Regional Hazard Mitigation Plans..... 23
Table 3: Identified Coastal Hazards throughout the Nine-Parish Region 26
Table 4: VAST Indicators and Weighting 33
Table 5: VAST Scores, I-10 at Lake Pontchartrain vs. Orleans Parish Average..... 37
Table 6: Priority Strategies 52

U.S. DOT Funding: The preparation of this document was financed in part through grants from the U.S. Department of Transportation, Federal Highway Administration, under the Metropolitan Planning Program, Section 104(f) of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

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1 Introduction

RPC Overview

The Regional Planning Commission (RPC) for Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, St. Tammany, and Tangipahoa Parishes is a 54-member board of local elected officials and citizen members, appointed to represent the public on regional planning issues. The Commission is supported by a staff of professionals with a diverse range of expertise, including transportation, land use, economic development, and environmental planning, as well as data management, analysis, and geographic information systems (GIS).

The RPC serves as the Metropolitan Planning Organization (MPO) for the region of southeast Louisiana that includes nine (9) parishes: Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany, and Tangipahoa. Taken together, this region is referred to as the Metropolitan Planning Area (MPA; see Figure 1). In its capacity as MPO, the agency is responsible for planning the metropolitan transportation system and programming the expenditure of federal transportation funds allocated to the region.

In addition to transportation planning, the RPC hosts several regional planning programs including an Economic Development Program, Brownfields Program, U.S. Department of Energy Designated Clean Cities & Communities Coalition, and Louisiana Watershed Initiative Region 8. The RPC is also currently participating in the Environmental Protection Agency's (EPA's) Climate Pollution Reduction Grant program and completed the region's first Priority Climate Action Plan in March 2024, and a Comprehensive Climate Action Plan was completed in December 2025. These initiatives complement the RPC's transportation planning activities, enhancing its capacity for regional planning and providing a holistic approach that considers the built environment as well as social and economic aspects of the region.

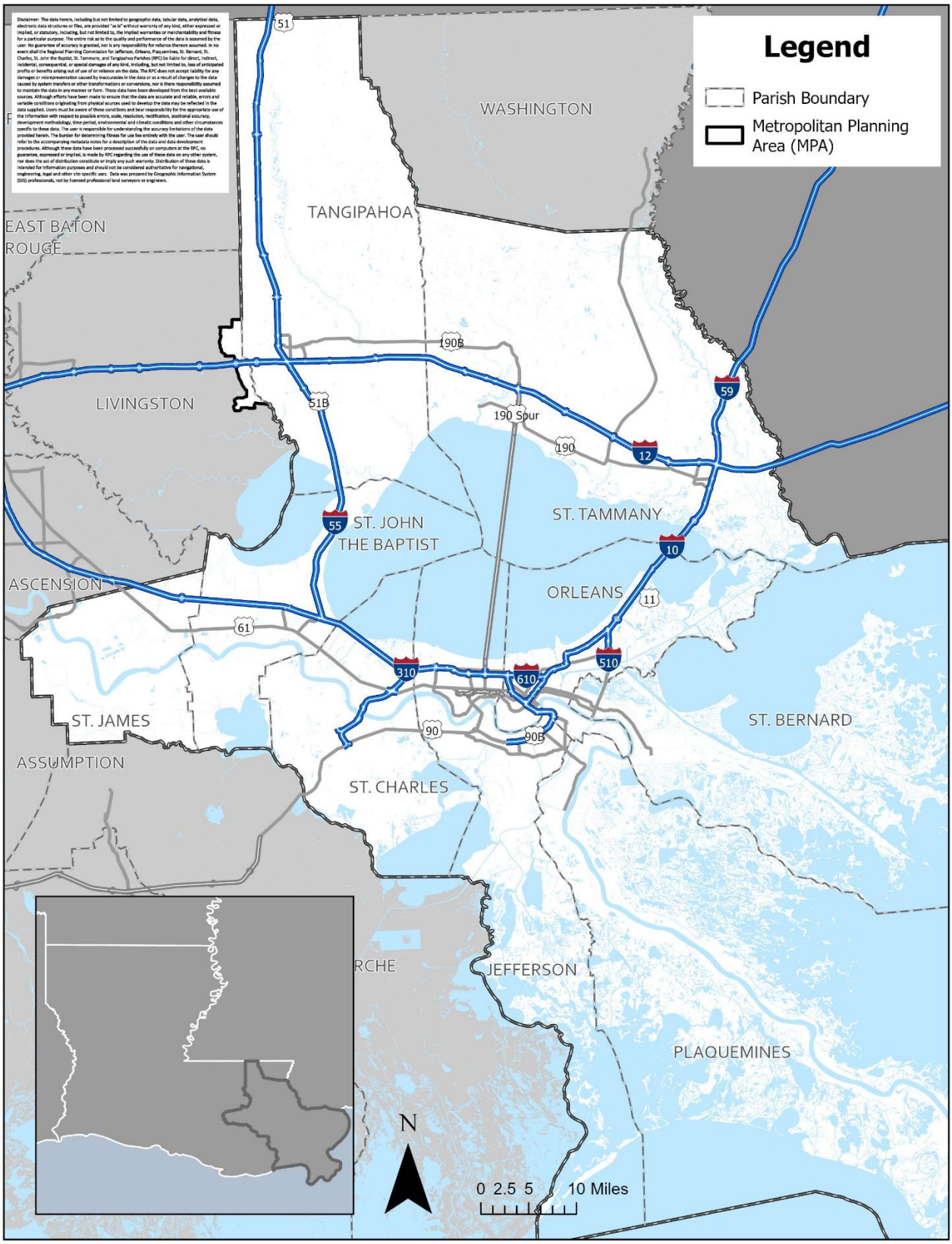


Figure 1: RPC Metropolitan Planning Area

Purpose and Need

The transportation system is the backbone of the region's economy, providing the means for individuals to travel to work and access educational opportunities, for tourists to visit the region's many destinations, and for goods to be transported to and from locations across the globe. This system is the result of over three centuries of ongoing public and private investment. In Federal Fiscal Year 2024 alone, over $95 million in federal funds were obligated to roadway projects in the RPC's Metropolitan Planning Area[1]. At the same time, the region is under consistent threat by a variety of natural hazards, described in greater detail in the Baseline Conditions chapter, that could damage, destroy, or otherwise render unusable key components of the transportation system. Protecting these investments from damage is not only fiscally responsible, but it also ensures that the region can continue to function for its residents, visitors, and businesses despite its vulnerability to natural hazards.

Given the threat of natural disasters to our region, the RPC recognizes the need to incorporate mitigation strategies and adaptation into future transportation planning. Recent changes to federal funding through the Infrastructure Investment and Jobs Act (IIJA) of 2021 (also known as the Bipartisan Infrastructure Law (BIL)) and Inflation Reduction Act (IRA) of 2022 now include more requirements and funding opportunities for incorporating resilience into transportation planning. Importantly, the IIJA created a new funding program, the Promoting Resilience Operations for Transformative, Efficient, and Cost saving Transportation (PROTECT) grant program (23 USC 176). This funding program provides both discretionary and formula funding for transportation resilience planning and projects.

More recently, the federal commitment to resilience planning has been reaffirmed through an Executive Order issued by the President on March 19, 2025 titled "Achieving Efficiency Through State and Local Preparedness."[2] Confirming the need for resilience planning, the order states, "Citizens are the immediate beneficiaries of sound local decisions and investments designed to address risks."[3] The order also directs the federal government to develop a National Resilience Strategy, a National Critical Infrastructure Policy, and other resilience-related policies that will guide the federal approach to resilience. As such the order builds upon the emphasis on resilience planning that was established in the IIJA and IRA, highlighting the importance of protecting transportation infrastructure from hazards.

[1]Regional Planning Commission (2024). Annual List of Obligated Projects FFY 2024. https://www.norpc.org/wp-content/uploads/2024/12/FY2024-Obligated-Projects.pdf

[2]Executive Order: Achieving Efficiency Through State and Local Preparedness (March 19, 2025). https://www.whitehouse.gov/presidential-actions/2025/03/achieving-efficiency-through-state-and-local-preparedness/

[3]Ibid.

Role of RPC in Resilience Planning

In recent years the RPC has taken initial steps towards incorporating transportation resilience into the larger transportation planning process. In 2019, the RPC created a Regional Transportation Resilience Analysis which reviewed existing planning documents to determine the state of transportation resilience in the region. This study found that work existed in the region around resilience and hazard mitigation planning, but no plans focused specifically on the resilience of the transportation network. Additionally, while individual communities have completed resilience plans or incorporated resilience and adaptation into their current planning work, no resilience plans consider the entire region.

With the increasing threat of climate change and more severe weather events, the RPC intends to incorporate more resilience planning into future work and create a framework to develop a long-standing program to guide these efforts. The RPC's current Metropolitan Transportation Plan (MTP) lists Sustainability and Resilience as one of the agency's core planning priorities and describes specific actions the RPC should take to enhance the community's ability to withstand disasters and disruptions. Efforts have been made to implement some of these recommendations, such as considering resilience at the project level during feasibility studies. Importantly, the MTP recommends the development of a regional resilience improvement plan.

This plan will outline broad strategies in addition to specific transportation projects that can help reduce the impacts of natural hazards in the region and build resilience. Strategies will focus on transportation assets, or projects that will have a direct impact on the surrounding transportation network. As an entity that serves the region, the RPC will also continue to look for expertise and existing knowledge within each parish when developing overall goals and strategies. These strategies will be designed for the whole region and will help provide a transportation resilience guide for entities that lack their own comprehensive plans or guides. Both immediate and long-range strategies will be identified; immediate strategies will coincide with current projects identified and will follow a timeframe similar to the Transportation Improvement Program (TIP) with a four-year timeline while long-range plans will follow a schedule aligned with the next MTP update, which will program projects through 2056. The RPC intends to provide updates to projects within this TRIP on a schedule similar to both the TIP and MTP.

About This Plan

This plan, the Transportation Risk and Infrastructure Protection Plan (TRIP), recognizes the importance of incorporating risk reduction measures into future planning. The TRIP follows Department of Transportation (DOT) and Federal Highway Administration (FHWA) guidance outlined in the PROTECT Formula and Discretionary Program (23 U.S.C. 176).

Based on PROTECT requirements, this plan includes:

- Immediate and long-range planning activities with respect to resilience of the surface transportation system within the boundaries of the MPO
- Consistency with State and local mitigation plans
- A risk-based assessment of vulnerabilities of transportation assets and systems to current and future weather events and natural disasters
- A systemic approach that considers all risks to the system, across all modes, geographic regions, and critical interdependent sectors
- Considers the full range of current and future weather events and natural disasters relevant to the transportation assets

See Appendix A for additional details about how this plan complies with PROTECT requirements.

As outlined in the IIJA, projects included in an FHWA-approved MPO resilience plan that meets the requirements of 23 US 176 will receive a local match reduction of 7% for PROTECT discretionary grants; further, if the plan is incorporated into the MTP the local match for PROTECT discretionary grants will be reduced by a further 3% for a total potential reduction of 10% (23 USC 176(e)).

The TRIP outlines existing hazards in the region and includes a risk-based analysis of the most frequent and highest impact hazards in the nine parishes contained within the MPA: Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany, and Tangipahoa. Specifically, the plan considers six transportation asset types within the nine-parish region, measures vulnerabilities to high priority hazards, and provides strategies to help reduce future risks and aid in recovery. Transportation assets analyzed include roads, bridges, non-motorized facilities, public transit, ports, and airports. The key hazards for the analysis were selected from high priority hazards identified in local and state hazard mitigation plans, and include precipitation, wind, sea level rise, heat, and storm surge. The TRIP also discusses additional hazards identified by stakeholders that may pose unique risks to individual asset types. This assessment will help local entities identify vulnerable assets and prioritize projects for future funding and implementation while also creating a framework and guide for the RPC to help better understand and plan for regional transportation resilience. The strategies outlined herein will follow the vulnerability assessment and align with available local, state, and federal funding.

It should also be noted that the plan is specifically focused on surface transportation assets and does not analyze the resilience of other community assets such as buildings, residences, emergency management assets, or energy, water, and communication

infrastructure. While the RPC recognizes the critical nature of these facilities to the community, this plan focuses on those assets over which it has the greatest influence: the regional transportation system. For example, while the RPC exists within a Regional Transportation Management Center, a coordinated DOTD effort that oversees roadway hazards and helps coordinate emergency response, this plan does not provide an analysis of these systems and corresponding buildings. The plan does, however, recommend strategies for working with partner agencies that are responsible for other community assets to align resilience planning across various sectors and infrastructure types.

Stakeholder Input

Stakeholder outreach commenced in 2023 when RPC hosted an informational webinar with government and public agencies to share resilience analyses completed to date, including a pilot vulnerability assessment based on FHWA's Vulnerability Assessment Scoring Tool (VAST). Following this webinar, the RPC also shared initial maps with all member parishes highlighting which transportation assets showed the highest vulnerabilities according to the pilot assessment. Input received at the workshop and feedback on the maps helped to inform this plan and vulnerability assessment.

The RPC hosted another workshop in March 2025 with a mix of transportation and resilience-focused stakeholders in the region that included local government, transit, port, and airport representatives. Led by the RPC, these workshops were designed to gather input both about the hazards reviewed in the region from local Hazard Mitigation Plans, and to develop strategies for potential resilience enhancements. The RPC also conducted multiple meetings and interviews with public agencies and local government to determine resilience goals and priorities.

To seek feedback on the vulnerability assessment results, the RPC hosted a webinar in November 2025 to share background data and how the results in the TRIP will be utilized. Any entity interested in reviewing the vulnerability assessment in their jurisdiction were invited to meet with the RPC to review results digitally or in-person. This additional assessment will help identify any further gaps or inconsistencies with the analysis and real-world risks.

Strategies shared during this workshop appear in the recommendations and strategies section of this plan. In addition to the workshops, the RPC also solicited feedback virtually through a strategy form to submit projects that are currently planned or in the process of planning. Results from these surveys appear in both the strategies list and the priority project list. The RPC plans to update the proposed project list within the TRIP as needed, similar to the Transportation Improvement Program (TIP), which identifies projects with planned and approved funding.

The RPC will also continue to solicit stakeholder feedback regarding transportation resilience moving forward. As discussed throughout this document, input from subject matter experts will be required to improve the TRIP's assessments and recommendations on an ongoing basis.

Defining Resilience

Resilience and resiliency have become ubiquitous descriptions of how well an entity or individual responds to an adverse impact. Definitions vary depending on the agency and subject. Many times, the term "resilience" becomes a catch-all term for how well a community responds to any disruption. The FHWA has defined resilience as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."[4]

Locally, resilience is often used to describe how well a community is planning for and responding to changing conditions, or adaptation. The state of Louisiana has defined resilience as, "a capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimal damage to social well-being, the economy, infrastructure, and the environment."[5] The City of New Orleans' 2015 resilience plan defined resilience as "the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience."[6] Louisiana's Strategic Adaptations for Future Environments (LA SAFE), which helped develop adaptation strategies for several parishes, defines both resilience and adaptation. LA SAFE defines adaptation as "the process of modifying behavior to suit changing environmental conditions" and resilience as "the capacity of individuals, communities, and systems to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience."[7]

The RPC defined resilience in its 2019 resilience assessment as:

"The capacity of the transportation network to return to normal working order following an interruption. Resilience as defined in this study encompasses the physical assets themselves and also accounts for operations, maintenance, appropriate supporting redundancies at vulnerable points, dependent and interdependent critical infrastructure (such as energy or water management), natural systems protections, and junctions at which transportation modes connect."

The 2019 analysis also defined transportation resilience as "the ability of transportation systems to move people and goods around in the face of one or more major obstacles to normal function."

[4]FHWA (2014). FHWA Order 5520. https://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm
[5]State of Louisiana (2023). Act 315.
[6]City of New Orleans (2015). Resilience New Orleans. https://nola.gov/nola/media/Resilience/Resilient_New_Orleans_Strategy.pdf
[7]LA SAFE (2019). Our Land and Water: A Regional Approach to Adaptation. https://s3.amazonaws.com/lasafe/Final+Adaptation+Strategies/Regional+Adaptation+Strategy.pdf

The 2019 analysis also defined transportation resilience as “the ability of transportation systems to move people and goods around in the face of one or more major obstacles to normal function.”

While not all agencies in the region have developed resilience-specific plans, resilience is still defined within various other plans and documents. As a region that faces some of the worst impacts of natural hazards due to our position on the Gulf Coast and frequent seasonal hurricanes, resiliency measures appear throughout much of the region’s plans.

As the RPC looks to incorporate resilience planning into more of its work beyond transportation planning, a new comprehensive definition is proposed:

Resilience for the RPC refers to the capacity of physical assets, including transportation and critical infrastructure; economic systems; and individuals to recover from a disruption and allow the community to return to normal working order and adapt to changing environmental conditions.



Goals & Desired Outcomes

Recognizing the importance of resilience planning to the functionality of the transportation system, the RPC's **goal** for this plan is:

Improve the regional transportation system's ability to withstand and recover from future hazards.

To achieve this goal, the individual elements of this plan will result in the following **outcomes**:

Table 1: TRIP Plan Elements and Expected Outcomes

Plan Element	Outcome
Baseline Conditions	A clear understanding of the region's relationship to natural hazards, including a list of hazards that have been identified by local stakeholders as high priority concerns.
Risk-Based Vulnerability Assessment	Identification of transportation assets across the region that may be at higher risk to damage by priority hazards.
Recommendations	Broad strategies and specific projects that may be used to reduce vulnerabilities of the transportation system.
Implementation Plan	A course of action for reducing transportation vulnerabilities and protecting infrastructure over the long term.

It is anticipated that this plan will be a key guide to enhancing regional resilience, thereby maintaining the transportation system's functionality following hazardous events, reducing potential harm to individuals and property, and protecting the public's infrastructure investment.

2 Baseline Conditions

Regional Overview

The TRIP analyzes vulnerability and resilience for the entire nine-parish region in Southeast Louisiana that comprises the RPC's MPA. While this region encompasses varying geographies, development patterns, and populations, its communities also share common vulnerabilities and opportunities to enhance resilience.

Geography

The region's geography is heavily defined by water with all nine parishes existing either along the Mississippi river or Lake Pontchartrain. Lake Pontchartrain creates what is commonly referred to as the Northshore which includes St. Tammany and Tangipahoa Parishes, and the Southshore which includes St. John the Baptist, St. Charles, Jefferson, and Orleans Parishes. St James, St. Bernard, and Plaquemines Parish do not border Lake Pontchartrain but are located along the Mississippi River. Both bodies of water feed into the Gulf via Lake Borgne in St. Bernard Parish and the terminus of the Mississippi River in Plaquemines Parish. These larger bodies of water and surrounding lakes, swamps, and connecting rivers all require a substantial number of elevated roads and bridges.



These same waterways also contribute heavily to the region's historical economy which includes ports along the Mississippi River, oil and gas extraction, and a seafood industry that thrives on the brackish marshes. These same industries that supported the local economy historically, have now contributed to some of the increases in hazards exposure with land loss due to controlling natural waterways and building canals and man-made inlets in marshland, further exacerbating subsidence and saltwater intrusion.

Demographics

The TRIP's study area is home to an estimated total population of approximately 1.4 million.[8] The population is majority white with approximately 52.4% of the population identifying as white, 32.6% as black, 0.5% Native American, 2.6% Asian, 0.1% Pacific Islander, 3.5% other, and 8.3% reporting multi-race; additionally, 11.0% of the population reports Hispanic or Latino ethnicity.[9] The region has a higher minority population (47.6%) than the US as a whole (37.0%), and similarly a larger share of the regions households live in poverty (17.3%) as comparted to the nation (12.0%).[10] Finally, 16.9% of the population is 65 or older.[11]

Economy

The RPC hosts an economic development program which is federally funded and designated as the Economic Development District for five of its member parishes of Jefferson, Orleans, Plaquemines, St. Bernard, and St. Tammany. Every five years, the RPC updates the Comprehensive Economic Development Strategy (CEDS) which provides framework for these five parishes. While the CEDs only covers 5 parishes within the RPC, the recommendations help guide economic development planning for the whole region. Current regional employment is led by the service and hospitality industry, followed by the medical industry, local government, and colleges and universities.[12]

The most recent CEDs, completed in 2024, recommends diversifying the region's economy and focusing on emerging industries for growth, community well-being, and resilience. Historically, the region's economy focused on oil and gas extraction and transportation along the Mississippi River. While these industries still shape the region, they no longer provide the greatest number of jobs and economic development.

[8] American Community Survey (ACS) 5-year estimates (2019-2023)
[9] Ibid.
[10] Ibid.
[11] Ibid.
[12] NORPC Comprehensive Economic Development Strategy, 2024-2028. https://www.norpc.org/wp-content/uploads/2023/11/CEDS_2024_FINAL.pdf

Social Vulnerability

The RPC recognizes the importance of incorporating social vulnerability into its transportation planning and resilience planning. Many of the indicators used to measure the vulnerability of a population are not transportation and resilience specific. This plan reports on demographic data such as age, race and ethnicity, poverty, and employment. In addition to these characteristics, 9.03% of households in the region lack access to a vehicle.[13]

The State's Hazard Mitigation Plan reviewed social vulnerability and the additional risks that populations may face and looked age, disability, poverty status, housing including mobile homes and location to a coastline to measure social vulnerability. While this plan does not explore the linkages between the physical vulnerability of the transportation system and social vulnerability, the RPC plans to analyze this critical connection in future planning efforts.

Key Transportation Infrastructure

The TRIP considers vulnerabilities and opportunities to enhance resilience on multiple components of the regional transportation system: roads, bridges, non-motorized facilities, public transit, airports and ports. Taken together, this infrastructure drives the local economy and connects the region's communities to each other and the rest of the world. It should also be noted that the region includes substantial freight and passenger rail infrastructure. While these facilities are also critical to the transportation system they are not included in the TRIP because this plan is focused on publicly owned infrastructure, and a significant portion of rail infrastructure is privately owned.

Road Network

Much of the RPC's transportation planning work is focused on the Federal-Aid Network, a subset of regional roadways that are eligible for most federal transportation funding programs. In general, roads designated as FHWA Functional Class 6 (Minor Collector) and higher are included on the Federal-Aid Network. Figure 2 shows Federal-Aid roadways in the nine-parish region.

[13]American Community Survey (ACS) 5-year estimates (2019-2023) Vehicles Available for Travel to Work (Place of Work Based)

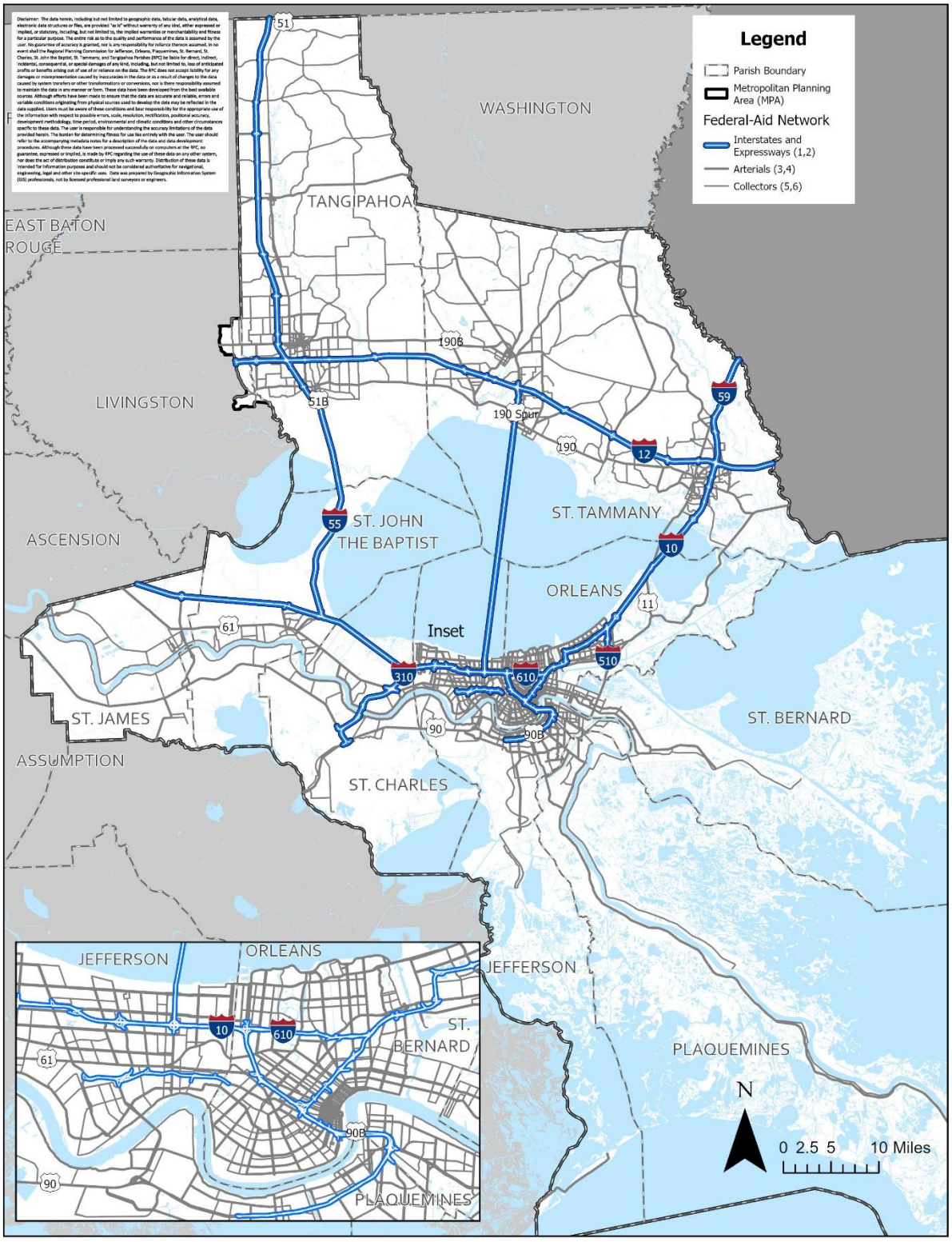


Figure 2: Federal-Aid Network (Source: DOTD (2023). Draft Federal-Aid Network.)

Roadways are also affected by their ownership. The state, parishes, municipalities, and independent agencies all own roads in the region. Each of these develops its own standards, maintains bridge and pavement preservation programs, and provides matching funds on Federal-Aid projects.

The nine-parish study area is connected to surrounding regions through a network of major interstate highways. Interstate 10, a primary east-west interstate highway, runs through New Orleans and connects the region to major cities such as Baton Rouge, Houston, Texas, and Jacksonville, Florida. Interstate 12 passes through the Northshore, connecting the cities of Slidell, Covington, and Hammond to Baton Rouge. Interstates 55 and 59 also connect the region to destinations to the north and northeast, respectively.

Within both large and small communities in the study area, city streets, sidewalks, bikeways, and transit lanes form an extensive transportation network. This network connects residential areas to commercial areas, public facilities, and serves as the primary transportation network for residents.

Bridges

As a region surrounded by major bodies of water including, much of the transportation network includes major key bridges to connect communities. Much of the region also exists within low-lying areas of swamp and wetland, adding to the number of bridges and elevated roads. Any overpass or elevated road structure is also categorized as a bridge for this TRIP.

The region contains a large number of bridges over open water, many over low-lying areas, and additional overpasses or elevated roads to accommodate the region's geography. Some of the longest bridges in the US exist within this region: the Lake Pontchartrain Bridge, Manchac Swamp Bridge, and the Bonnet Carre Spillway Bridge. Other Major bridges include the Interstate-10 Twin Spans Bridge and Mississippi River crossings at the Crescent City Connection, Huey P. Long, Hale Boggs, Veterans Memorial, and Sunshine Bridges. Given the critical role bridges play in connecting the region, assessing their vulnerability and potential resilience enhancements is a high priority for the RPC and the communities it serves.

Public Transit

The region is served by two major public transit agencies, the Regional Transit Authority (RTA) that serves Orleans Parish and portions of Jefferson Parish, and JP Transit which serves Jefferson Parish. The RTA includes a network of buses that primarily service Orleans Parish with routes that extend into both neighboring Jefferson and St. Bernard Parishes. Additionally, the RTA runs five streetcar lines on designated tracks throughout Orleans Parish and provides ferry service across the Mississippi River from downtown New Orleans to Algiers Point, and Algiers Point to Chalmette. JP Transit runs multiple bus lines that service both the east and west banks of Jefferson Parish and provide service

transfers to RTA routes within Orleans Parish.

Additional public transit systems exist within the region including St. Bernard Parish's St. Bernard Urban Rapid Transit (SBURT), St. Tammany Area Transportation (STAR Transit), River Parishes Transit Authority (RPTA), Tangi Transit in Tangipahoa Parish, and the Plaquemines Port Harbor Terminal District (PPHTD) which operates ferries within Plaquemines Parish.

Airports

The region is served by the Louis Armstrong New Orleans International Airport (LANOIA) in Kenner, Louisiana. While other smaller, local airports exist throughout the region including the Lakefront Airport in New Orleans, Louis Armstrong serves as the largest and highest trafficked airport in the region, providing flights both domestically and internationally. In addition to its passenger traffic, the airport also serves cargo air traffic and includes major carriers such as FedEx, UPS, and DHL. This airport acts as a major economic driver to the region and served over 13 million passenger trips in 2024.[14]

Ports

The region contains an extensive port and waterway network which is vital to its economy and transportation infrastructure. The region is served by four major public ports: the Port of New Orleans, Port of South Louisiana, Louisiana Gateway Port, and St. Bernard Port Harbor and Terminal District.

Port of New Orleans: The Port of New Orleans is a major international trade gateway located along the Mississippi River in New Orleans. It is one of the busiest ports in the United States, handling cargo such as containerized goods, breakbulk cargo, and bulk commodities. The port also serves as a cruise ship terminal, with over 1.2 million passengers served in 2024.[15] The Port of New Orleans is currently planning a major expansion of its freight facilities down river in Violet, Louisiana in St. Bernard Parish, the proposed Louisiana International Terminal to allow for easier access to the Gulf.

Port of South Louisiana: The Port of South Louisiana stretches for 54 miles along the Mississippi River in St. Charles, St. John the Baptist, and St. James Parishes. It ranks first in the country in total trade volume, handling crude oil, petroleum products, coal, chemicals, grain, and other commodities.[16]

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[14]Louis Armstrong New Orleans International Airport (2024). 12/31/2024 Data & Statistics. https://flymsy.com/wp-content/uploads/2025/03/Airline-Statistics-December-2024.pdf

[15]Port of New Orleans (2025). Port of New Orleans Sets All-time Record for Cruise Passenger Moves. https://portnola.com/info/news-media/press-releases/port-of-new-orleans-sets-all-time-record-high-for-cruise-passenger-moves

[16]Port of South Louisiana (2025). Overview. https://portsl.com/overview/

Louisiana Gateway Port: The Louisiana Gateway Port, formerly known as the Port of Plaquemines, is situated near the mouth of the Mississippi River at mile marker 51 Above Head of Passes (AHP), Louisiana and handles 50 million tons of cargo annually, primarily including petroleum products, gasoline, coal, LNG, and grain.[17]

St. Bernard Port Harbor and Terminal District: Located in St. Bernard Parish, the St. Bernard Port Harbor and Terminal District operates 430 acres of intermodal facilities along the lower Mississippi River, and in 2023 handled six million tons of bulk, break bulk, and general cargo.[18]

Inland Waterways: The region is crisscrossed by a network of inland waterways including the Mississippi River, the Intracoastal Waterway, industrial canals, and numerous bayous. These waterways provide critical transportation routes to and from the region's ports and connect them to industrial facilities such as refineries, petrochemical plants, and manufacturing sites.

Regional Resilience Planning

Much of the nine-parish region is working towards building resilience, through resilience-focused plans that address resilience or adaptation specifically, or through incorporating resilience measures into larger plans and codes.

All nine parishes have published four-year Hazard Mitigation Plans that comply with Federal Emergency Management Agency (FEMA) requirements. All nine of those plans are analyzed in the Hazards Assessment section of this report. In addition to Hazard Mitigation Plans, many local agencies have developed other plans related to reducing hazards. LA SAFE was created as a program to reduce flood risk and increase resilience in communities affected by Hurricane Issac in 2012, and funded the development of plans or adaptation strategies are designed to address on-going flood risks and build community resilience. In addition to those plans, multiple parishes have resilience or resilience-focused plans. Local planning efforts include:

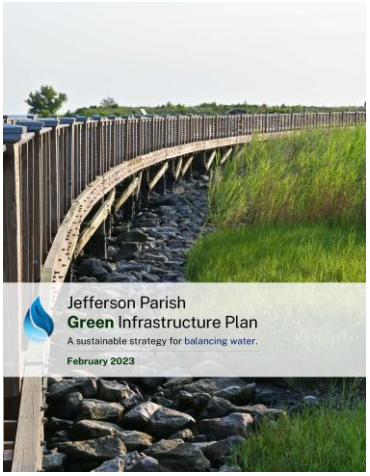
- Resilient New Orleans
- Jefferson Parish Green Infrastructure Plan
- Tangipahoa Parish Community Recovery Plan
- LA SAFE – Jefferson Parish Adaptation Strategy
- LA SAFE – Plaquemines Parish Adaptation Strategy
- LA SAFE – St. John the Baptist Parish Adaptation Strategy
- LA SAFE – St. Tammany Parish Adaptation Strategy

[17]Louisiana Gateway Port (2025). Why Choose Us? https://louisianagatewayport.com/why-choose-us/
[18]St. Bernard Port Harbor and Terminal District (2025). Our Facilities. https://www.stbernardport.com/our-facilities

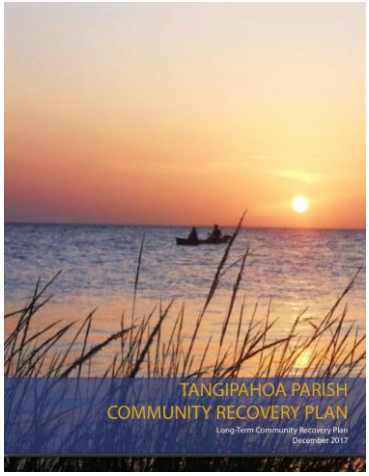
While not all of these are exclusively resilience plans, many focus on adaptation to weather stressors and disaster recovery. Since precipitation and flooding due to tropical cyclones are the most prevalent and highest risk hazards in the region, many of these plans focus on flooding.

Many local plans are supported by regulations that encourage, incentivize, or require the use of resilience improvement strategies in both public and private developments and infrastructure. For example, following the completion of the Jefferson Parish Green Infrastructure Plan, the Parish formally incorporated the plan into its parishwide Comprehensive Plan. In Tangipahoa Parish, the Flood Prevention and Protection Ordinance adopted in 2024 establishes requirements for property owners and developers to implement flood mitigation measures when making certain improvements to their property. Similarly, the City of New Orleans Comprehensive Zoning Ordinance establishes limits on the percentage of yard area can be covered with impermeable surfaces. The number and breadth of such regulations prevent the creation of a comprehensive listing or analysis of each ordinance, code and standard enacted by every parish and municipality in the region. However, any new development or transportation asset in the region would trigger compliance with any local codes, including any project identified in this plan or approved by the RPC. Additionally, this plan recommends strategies developed with stakeholder input that will help strengthen and expand on these existing codes.

The State of Louisiana works on coastal resilience planning through the Coastal Protection and Restoration Authority (CPRA). This program utilizes both federal and state funds to plan and program restoration projects throughout the state that focus on restoring that state's natural ecosystems that together protect critical assets and infrastructure. Much of the state's land rebuilding through sediment diversions and wetland restoration occurs through this program.



Jefferson Parish's Green Infrastructure Plan



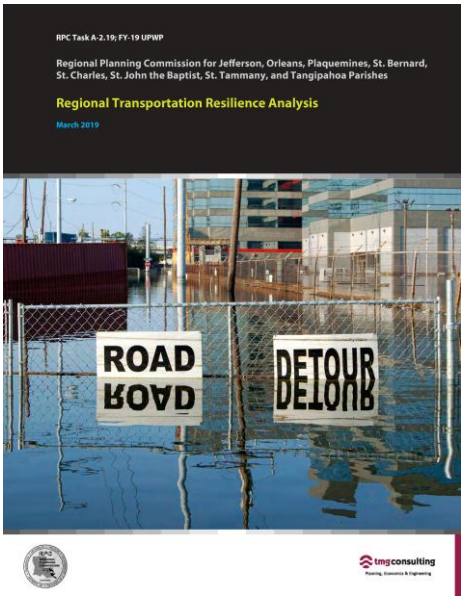
Tangipahoa Parish Community Recovery Plan

RPC's Past Resilience Work

The 2019 Regional Transportation Resilience Analysis included a review of all existing resilience work, planning documents, and transportation plans in the region to gauge prior efforts at assessing and improving transportation resilience. This resilience analysis started the work of reducing risks associated with the regional transportation system. Importantly, it found that while many entities are planning for future risks and hazards and incorporating resilience into their plans, no comprehensive assessment has been done to measure the resilience and vulnerability of the regional transportation system.

Resilience and planning for sustainable transportation systems remain key goals of both the RPC's MTP and the Unified Planning Work Program (UPWP) which guides the organization's work and programming. Both the MTP and UPWP call for the creation of this plan and an associated vulnerability assessment.

In 2023, the RPC continued to advance its resilience planning program by conducting a pilot transportation vulnerability assessment using FHWA's VAST. This analysis considered vulnerabilities on Federal-Aid roads and bridges to three hazards: precipitation, sea level rise, and storm surge. This effort provided the groundwork for much of the TRIP. As mentioned previously, the initial results of the assessment were presented to stakeholders for review and comment. This input helped the RPC refine its evaluation processes and determine regional needs for the TRIP. Moreover, lessons learned from the pilot VAST helped the RPC determine appropriate data sources and analysis methodologies for future assessments.



RPC Regional Transportation Resilience Analysis

Hazards Assessment

Recent hazards and events, as well as State and Parish-level Hazard Mitigation Plans provide a clear understanding of the risks in the nine-parish region.

Recent Hazards and Events

Southeast Louisiana has long been impacted by natural hazards and weather events that both disrupt daily life and cause interruptions to the surrounding transportation network. Tropical cyclones, including hurricanes, are among the most destructive hazards affecting the region. Flooding caused by precipitation and increased rain events also routinely disrupts the transportation network with road closures due to standing or pooling water. In recent years, additional hazards and weather events have also begun impacting the region and surrounding transportation network.

Hurricane Ida – August/September 2021

While the region routinely experiences hurricanes and impactful storms, Hurricane Ida sticks out for its rapid intensification. This rapid intensification of tropical systems greatly impacts the region by lessening the time to prepare for evacuations and sheltering in place. The National Oceanic and Atmospheric Administration (NOAA) predicts that as climate change worsens, storms will increase in intensity and may do so at a more rapid pace with greater sea surface temperatures.[19]

Fog and Wildfire Smoke Events – October/November 2023 and December 2024

In 2023, the region experienced a series of extreme fog events, forcing the closure of major roads and bridges in the region. Combined with smoke from surrounding marsh fires that occurred simultaneously, these conditions created "super fog" that substantially decreased visibility. In October 2023, a super fog event along I-55 in St. John the Baptist Parish caused a traffic crash with over 150 vehicles, including injuries and fatalities.[20] In the following weeks, this event triggered multiple road and bridge closures throughout the region when similar conditions occurred. Another extreme fog event on December 17, 2024, created a multi-vehicle pileup with over 40 vehicles involved along the Lake Pontchartrain Causeway in St. Tammany Parish.[21]

[19]NOAA (2024). Global Warming and Hurricanes. https://www.gfdl.noaa.gov/global-warming-and-hurricanes/

[20]Dryfoos, D. (2023) Historic drought at root of "superfog" and massive I-5 wreck. *The Lens*. https://thelensnola.org/2023/10/26/historic-drought-at-root-of-superfog-and-massive-wreck-that-shut-down-i-55/

[21]Fox 8 (2024). Six crashes on Causeway Bridge involve 40+ vehicles, leave 33 injured. https://www.fox8live.com/2024/12/17/up-40-50-vehicles-separate-crashes-cause-closure-causeway-both-directions/

Drought – Summer and Fall 2023

In 2023 extreme drought throughout the Mississippi River watershed and the southeast Louisiana region caused record low water levels along the Mississippi River. These low levels created navigational challenges as barges and ships ran aground, slowing the movement of crucial commodities such as grain. This drought created abnormally dry conditions in Louisiana and prompted both wildfires and marsh fires within the region. In addition to causing lower traffic visibility, smoke created air quality conditions across the region prompting the use of respiratory masks and air alerts, impacting pedestrians and cyclists. Increased periods of drought can also impact the region's infrastructure as soils can shift and compact in the absence of rainfall. Increased drought periods also put tree canopies at risk which can further exacerbate heat island affects.

Saltwater Intrusion – October/November 2023

Brought on by the same drought that created marsh and wildfires in the region, a reduction in both local and national rainfall lowered the levels of the Mississippi River enough to slow the river's outflow at the Gulf of Mexico in November 2023. This decrease in flow allowed a saltwater wedge to enter the river and threatened drinking water supplies from Plaquemines Parish into Jefferson Parish. While this event did not directly impact the transportation network, it highlights how changes in weather patterns nationally still impact the region and disrupt daily life.

Extreme Heat Events – 2023/2024

Each year summer temperatures increase, both with higher daily highs and higher lows. These increases in temperature negatively impact human health as more daytime temperatures are reported unsafe to spend considerable amounts of time outside. Pedestrians, cyclists, and transit riders are all affected by these higher temperatures as they spend more time outside exposed to extreme heat. Extreme heat also has the potential to impact infrastructure such as airports, rail, and roads. More urban environments throughout the region experience heat island effects from a concentration of impervious surfaces and a lack of green infrastructure and tree canopy.

These recent events illustrate the need to plan for hazards in a changing climate and account for scenarios that could intensify if greenhouse gas emissions are not meaningfully reduced. To reduce the risks associated with climate change, adaptation and mitigation should occur in tandem, and green infrastructure should be prioritized where practical. While climate and weather events will continue to change over time, this resilience plan considers scenarios based on both current and future weather events. The plan also considers strategies with co-benefits that together can improve resilience to natural hazards and mitigate the effects of climate change and improve public health.

Hazard Mitigation Plans

The Hazard Mitigation Plans created by local agencies provide one of the best methods for understanding local priorities and concerns. To guide the TRIP's development, the RPC reviewed each plan and merged their hazards assessments to create an overall, regional priority hazards assessment. All Hazard Mitigation plans reviewed for the TRIP were completed between 2019 and 2024.

Hazards in the State of Louisiana

The State of Louisiana's 2024 Hazard Mitigation Plan provides a hazard and risk profile for the entire state. The plan emphasizes that the state's location along the Mississippi River and the Gulf of Mexico greatly contributes to the state's hazard profile. The plan also recognizes that the State's history of controlling flood waters along major waterways such as the Mississippi River has resulted in subsidence and increased flood threats. Additionally, contributing to the State's vulnerability is the erosion of the State's coastline which further contributes to subsidence and land loss that can increase impacts from sea level rise and flooding. With these physical limitations highlighted, many of the state's hazards reflect this geography.

The plan utilized the probability of future risk based on future land use, population, weather events, impacts of vulnerable assets and populations, and the economic impact to determine 12 hazards as the highest risk for the state. These 12 hazards include: extreme heat, drought, wildfire, extreme cold, wind, hail, lightning, tornado, flood, earthquake, sinkhole, and expansive soils. These hazards and their risk profile were reviewed with estimates of conditions through 2050.

The plan also considered social vulnerability in the state and used American Community Survey (ACS) data to identify both demographic vulnerabilities such as age, disability, poverty status, and mobile homes, and geographic vulnerabilities such as proximity to the coast. Based on this assessment, the State identified St. Bernard, Plaquemines, Ascension, St. Tammany, West Baton Rouge, and Richland Parishes as the most socially vulnerable. Three of the six identified parishes exist in the RPC's region.

Hazards in the Region

The RPC reviewed the hazard mitigation plans for all nine parishes within the RPC's boundaries. These plans represent updates to plans from 2019 onward and recognize a range of hazards unique to each parish. All nine parishes include rankings in their hazard mitigation plans and identify the highest risk hazards. Since the nine-parish region varies in land use and geography, hazards and their overall risks identified by each Parish vary. Methodologies of how each Parish selected specific hazards and their risk factors also vary. The RPC used these hazard profiles to define risks in the region and further study how these hazards impact the region.

Hazards Methodology

Each parish's methodology for ranking priority hazards is described below. Since parishes used different methods to rank the risks posed by hazards, RPC normalized rankings into a simplified "high," "medium," or "low" classification to allow for comparisons across parishes. This process is included in each description as appropriate.

The methodology for selecting the highest ranked hazards for each Parish varies. St. Bernard Parish, St. Tammany Parish, Plaquemine's Parish, and St. John the Baptist Parish all used the same methodology to identify and rank hazards. All four of these plans were written by the Stephenson Disaster Management Institute within Louisiana State University with input from the Parish. Hazards were first selected based on prevalence in the community and their previous occurrences based on historical records. The probability of each of these events occurring again was calculated by the date of the last occurrence and the time period since the event took place. The probability score (ranked unlikely to highly likely), impact (ranked minor to catastrophic), spatial extent (ranked negligible to large), warning time (ranked more than 24 hours to less than 6) and duration (less than 6 hours to more than one week) were all used and given specific weights to determine the Priority Risk Index and Hazard Risk. Scores ranging between 2.5 to 4.0 were given a "high risk" profile, while scores ranging between 2.0-2.4 were given a "moderate risk" profile. Scores ranging between 0 to 1.9 were given a "low risk" risk factor. In normalizing regional hazard rankings, the RPC modified the "moderate risk" to a medium risk to compare with other regional parishes.

Orleans Parish, Jefferson Parish, Tangipahoa Parish, St. Charles Parish, and St. James Parish all took different approaches to identifying their Parish's hazards and risk profile. St. Charles Parish used a steering committee and presidentially declared disasters as criteria. A dollar loss was also applied to major disasters including past droughts, floods, wind events (excluding hurricanes), tornadoes, tropical cyclones, and winter storms. Data sources for St. Charles' analysis came from Flood Insurance Rate Maps, the National Centers for Environmental Information (NCEI), and steering committees. Tangipahoa Parish used a similar approach by utilizing a steering committee, input from the public, and a review of past disaster declarations and archived disaster instances, and available data such as FIRMs and Flood Insurance Studies. Both parishes used a "low," "medium," and "high" priority ranking to profile each hazard.

The City of New Orleans (Orleans Parish) used the frequency of past disasters to determine hazard risks. This analysis overwhelmingly showed that flood and tropical cyclones posed the most risk to the parish historically based on past occurrences. To incorporate climate change and the increase in both the frequency and severity of disasters, the Parish also used data from NOAA and the National Climate Data Center (NCDC) database to determine the future risk and frequency of these disasters. Flooding, coastal erosion, subsidence, extreme heat, and severe thunderstorms were all given a 100% probability of occurring in the parish and tropical cyclones a 96% probability.

For this report, the RPC valued these hazards with a "high" risk profile to compared to the adjacent regional parishes.

Jefferson Parish used multiple factors in determining which hazards pose the most risk to the parish. The parish used a ranking system that considered history, future probability, spatial extent/location, potential for mitigation, impact/vulnerability (presence of susceptible areas), data availability, and federal disaster declarations and local emergency declarations. This analysis is similar to the four plans prepared by Louisiana State University (LSU) but includes additional factors like mitigation and vulnerability. These factors were all given a score between one and three for each hazard and floods, hurricanes and tropical cyclones, storm surge, subsidence, and coastal erosion all ranked as the highest risk hazards for the parish. For the TRIP, the RPC gave these hazards a rating of "high" to compare with the region. Tornadoes, Extreme Heat, Hailstorms, Lightning, and Winter Storms were not identified as the most significant by the Parish but still had double-digit scores, so the RPC ranked these hazards as a "medium risk." The remaining identified hazards, drought, wildfires, and earthquakes all received a "low risk" rating by The RPC as they ranked with single-digit values by the Jefferson Parish plan.

St. James Parish used similar methodology to Jefferson Parish by ranking hazards based on the history of past declared disasters, the probability of future occurrences, and the overall impact of disasters. St. James identified tropical cyclones and flooding as two most prevalent and destructive hazards in the parish. The Parish ranked coastal hazards/subsidence, drought, flooding, sinkholes, tornadoes, tropical cyclones, and wildfires as the highest risk with high priority ratings.

Priority Hazards

Based on a review of all nine plans, flooding, coastal hazards (including erosion, land loss, sea-level rise, and subsidence), tropical cyclones, thunderstorms, and tornadoes were ranked as the highest risk to each parish. Flooding and tropical cyclones (including hurricanes) were both the most frequently cited hazards as a high priority for each parish, and the highest ranked in terms of risk for all nine parishes. Table 2 lists the hazards ranked as a high priority by at least one parish.

Table 2: Hazards Ranked as a High Priority in Regional Hazard Mitigation Plans

Hazard Type	Parish	Plan Indicated
Flooding	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update
	St. Bernard	2020 St. Bernard Parish Hazard Mitigation Plan
	St. Charles	St. Charles Hazard Mitigation Plan 2019
	St. John the Baptist	St. John the Baptist Parish - 2021 Update
	St. Tammany	St. Tammany Parish Multi-Jurisdictional Hazard Mitigation Plan Update
	Tangipahoa	Tangipahoa Hazard Mitigation Plan

Hazard Type	Parish	Plan Indicated
Flooding	Orleans	Hazard Mitigation Plan - City of New Orleans - 2021
	St. James	St. James Parish Hazard Mitigation Plan 2022
	Jefferson	2020 Multijurisdictional Hazard Mitigation Plan Update
Tropical Cyclones (including Hurricanes)	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update
	St. Bernard	2020 St. Bernard Parish Hazard Mitigation Plan
	St. John the Baptist	St. John the Baptist Parish - 2021 Update
	St. Tammany	St. Tammany Parish Multi-Jurisdictional Hazard Mitigation Plan Update
	Orleans	Hazard Mitigation Plan - City of New Orleans - 2021
	St. Charles	St. Charles Hazard Mitigation Plan 2019
	Tangipahoa	Tangipahoa Hazard Mitigation Plan
	Jefferson	2020 Multijurisdictional Hazard Mitigation Plan Update
Thunderstorms	St. John the Baptist	St. John the Baptist Parish - 2021 Update
	St. Tammany	St. Tammany Parish Multi-Jurisdictional Hazard Mitigation Plan Update
	Tangipahoa	Tangipahoa Hazard Mitigation Plan
	St. Benard	2020 St. Bernard Parish Hazard Mitigation Plan
	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update
	Orleans	Hazard Mitigation Plan - City of New Orleans - 2021
Coastal Hazards	Jefferson	2020 Multijurisdictional Hazard Mitigation Plan Update
	St. Tammany	St. Tammany Parish Multi-Jurisdictional Hazard Mitigation Plan Update
	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update
	St. Bernard	2020 St. Bernard Parish Hazard Mitigation Plan
	St. James	St. James Parish Hazard Mitigation Plan 2022
	Orleans	Hazard Mitigation Plan - City of New Orleans - 2021
Tornadoes	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update
	St. Bernard	2020 St. Bernard Parish Hazard Mitigation Plan
	St. John the Baptist	St. John the Baptist Parish - 2021 Update
	St. Tammany	St. Tammany Parish Multi-Jurisdictional Hazard Mitigation Plan Update
	Tangipahoa	Tangipahoa Hazard Mitigation Plan

While each Parish cited coastal hazards, flooding, tropical cyclones, thunderstorms, and tornadoes as the greatest risks, the definitions of coastal hazards, flooding, and tropical cyclones show substantial variance between parishes. Due to the variety of risks caused by these hazard types, RPC provides additional explanation below.

Coastal Hazards

Coastal hazards can include any range of hazards that occur due to a parish's coastal geography. Due to the variation in coastal hazards between parishes, this section further defines these hazards to determine which individual risks account for the definition. For the purpose of this study, RPC considers each different coastal hazard type listed by a member parish as a coastal hazard. Based on a review of all nine Hazard Mitigation Plans, coastal hazards include coastal erosion and land loss,[22] storm surge, subsidence, sea level rise, coastal flooding, and saltwater intrusion. All nine parishes identify coastal hazards as a risk and all parishes except Tangipahoa Parish and St. Charles Parish identify coastal hazards as a high risk. Table 3 shows all identified coastal hazards across nine parishes and their risk priority.

While subsidence can contribute to coastal land loss and exacerbate sea level rise, subsidence itself is not a coastal hazard as it is defined as soil expansion and can occur within inland areas with no coastal geography. The City of New Orleans, Jefferson Parish, and Tangipahoa Parish all identify subsidence as a hazard, but do not classify this hazard specifically as a coastal hazard. Both the City of New Orleans and Jefferson Parish, two coastal Parishes, identify the hazard as a high risk. However, St. James Parish and Plaquemines Parish include subsidence in their coastal hazards profile. St. James Parish recognized coastal land loss as the biggest contributor to the coastal hazard's definition. While the boundaries of St. James Parish do not exist along a coastal waterway, the Parish borders several wetlands that are impacted by saltwater intrusion which lead to erosion and land loss. Due to its location along the Mississippi River, the parish also experiences subsidence due to decreasing sediment resulting in a loss of elevation which makes it more susceptible to flooding and storm surge events from neighboring parishes.

Plaquemines Parish includes all three types of hazards_in their "coastal hazards" identification listing land loss, sea level rise, and subsidence. The definition provided for coastal hazards includes a definition on coastal land loss and recognizes various contributors to land loss including erosion, subsidence, saltwater intrusion, coastal storms, littoral drift, changing currents, manmade canals, rates of accretion, and sea level rise. All of these listed hazards contribute to coastal land loss which the Parish's Hazard Mitigation Plan recognizes as the main coastal hazard. The parish's geography, which includes the terminus of the Mississippi River, and its position along the Gulf make

[22]Parishes either included coastal erosion or coastal land loss to refer to land loss occurring due to coastal forces. No parish reported on non-coastal erosion, such as inland erosion. Jefferson and Orleans Parishes use the same definition.

it especially vulnerable to these coastal hazards.

Understanding that subsidence itself is not a coastal hazard, in the context of the region, the TRIP includes it as a coastal hazard as many parishes include subsidence as a contributor to coastal land loss, if not a coastal hazard itself.

Table 3: Identified Coastal Hazards throughout the Nine-Parish Region

Hazard Type	Parish/City/Entity	Plan Indicated	Priority
Coastal Erosion	City of New Orleans - Orleans Parish	Hazard Mitigation Plan - City of New Orleans - 2021	High (100% probability)
Subsidence	City of New Orleans - Orleans Parish	Hazard Mitigation Plan - City of New Orleans - 2021	High (100% probability)
Coastal Erosion	Jefferson Parish	2020 Multijurisdictional Hazard Mitigation Plan Update	High
Subsidence	Jefferson Parish	2020 Multijurisdictional Hazard Mitigation Plan Update	High
Sea Level Rise	Jefferson Parish	2020 Multijurisdictional Hazard Mitigation Plan Update	Medium
Coastal Flooding	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update	High
Coastal Hazards (land loss, sea level rise, subsidence)	Plaquemines	Plaquemines Parish Hazard Mitigation Plan Update	High
Coastal Hazards/Subsidence	St. Bernard Parish	2020 St. Bernard Parish Hazard Mitigation Plan	High
Coastal Erosion	St. Charles Parish	St. Charles Hazard Mitigation Plan 2019	Medium
Land Subsidence	St. Charles Parish	St. Charles Hazard Mitigation Plan 2019	Medium
Saltwater Intrusion	St. Charles Parish	St. Charles Hazard Mitigation Plan 2019	Medium
Expansive Soils (subsidence)	St. John the Baptist	St. John the Baptist Parish - 2021 Update	High
Coastal Hazards	St. Tammany Parish	St. Tammany Parish Multi-Jurisdictional Hazard Mitigation Plan Update	High
Coastal Land Loss	Tangipahoa	Tangipahoa Hazard Mitigation Plan	Medium
Subsidence	Tangipahoa	Tangipahoa Hazard Mitigation Plan	Medium
Coastal Hazards	St. James Parish	St. James Parish Hazard Mitigation Plan 2022	High
Expansive Soils	St. James Parish	St. James Parish Hazard Mitigation Plan 2022	High

Flooding

Identified by all parishes as the highest natural hazard risk, flooding can damage infrastructure, natural ecosystems, and threaten human health and safety. Flooding is also the most common hazard in the region and the state. Flooding due to increased precipitation is the most common cause of flooding that affects all parishes throughout the year. In addition to precipitation-caused flooding, each parish in the region can experience different forms of flooding that can include riverine flooding from rivers, coastal flooding from either change in tides or storm surge, and flash, ponding, back-water, and urban flooding. The RPC plans to further define flooding and flood risks unique to each parish and the region in more depth within a regional watershed plan under the Louisiana Watershed Initiative (LWI).

Tropical Cyclones

Tropical cyclones, including tropical depressions, tropical storms, and hurricanes, also affect every parish in the region and are the second highest profiled hazard. Formed in the Atlantic Ocean, tropical cyclones are low-pressure systems consisting of thunderstorms that spin counterclockwise and contain windspeeds of at least 39 mph. These storms pose a greater risk to the RPC region as they can gain strength in warmer waters with humid air, features common off the cost of Louisiana. Tropical cyclones also can cause additional risks with high winds, high precipitation, and storm surge both from coastal waters entering local waterways and raising water levels and direct storm surge impact on the coast. Additional risks can also occur after windspeeds return to normal, including exposure to elements due to power outages and infrastructure failures.



3 Vulnerability Assessment

Risk-Based Vulnerability Assessment

The RPC utilized the FHWA's Vulnerability, Assessment, and Adaption, Framework (3rd ed.) for guidance on performing a risk-based transportation vulnerability assessment.[23] Risk is a measure of both the probability an asset will experience a climate hazard and the severity of that impact. Low probability may still have severe consequences, while high probability may have minimal. Estimating risk through probability and consequence is not a simple task. The RPC considered a host of attributes for each of the six selected transportation asset types when assessing vulnerabilities. Roads and bridges were assessed through a quantitative process based on available data, while the assessment of other assets, such as ports, airports, and public transit facilities, relied on the expertise of stakeholders. These assessment processes and their results are described below.

Assets Evaluated

The assessment focused on five (5) categories of publicly owned transportation assets:

Roads on the Federal-Aid Network,[24] which is the subset of regional roads that are eligible for federal transportation funding through the U.S. Department of Transportation.

Bridges on the Federal-Aid Network

Ports that are publicly owned

Airports, particularly the Louis Armstrong New Orleans International Airport

Public Transit facilities owned by transit operators that operate fixed-route transit (e.g., bus, streetcar, and/or ferry)

[23] FHWA (2017). Vulnerability, Assessment, and Adaptation Framework (3rd ed.). https://rosap.ntl.bts.gov/view/dot/36188

[24] The road and bridge assessment was completed for roadways in the nine parishes encompassed by the RPC's MPA. Roads were selected using the draft Federal-Aid network provided by DOTD to the RPC in August, 2023. A final version of the network is anticipated to be substantially similar to the draft and is not expected to significantly alter the assessment.

Assessment and Results

The RPC's approach to assessing vulnerability was based on the type of assets considered, the complexity of those assets, and the availability of data. Roads and bridges allowed for a standardized, quantitative analysis because they are fixed in a single location, and a relatively large volume of data exists that describes their conditions. By contrast, public transit systems consist of movable assets such as buses as well as various other facilities like maintenance buildings, ferry terminals, bus shelters, and streetcar catenaries. Such complex systems are difficult to assess through a single quantitative process; moreover, data indicating vulnerability varies considerably between asset types and transit operators. As such, the assessment of transit assets relied heavily on qualitative input from expert stakeholders. Ports and airports presented similar challenges in terms of complexity and data availability, and were also primarily assessed through stakeholder input. Regardless of the method used, all assets were assessed on a risk-based approach, which prioritized vulnerabilities based on the risk they actually pose to the transportation system.

Roads and Bridges

The RPC used FHWA's Vulnerability Assessment Scoring Tool (VAST) to evaluate vulnerability on roads and bridges. VAST is a spreadsheet-based tool that uses various data inputs to create a score that rates individual assets' vulnerability to a given hazard on a scale of one (1) to four (4), with one being the least vulnerable and four being the most vulnerable.

VAST Assets

To evaluate roadways in VAST, the RPC used geoprocessing software to create points every 350 feet along all Federal-Aid roads in the region. These points were then assigned characteristics based on their location, features, and other available data. These characteristics, referred to as vulnerability indicators, were then combined in VAST to calculate vulnerability scores for each point, for each of the hazards assessed. The RPC assessed vulnerability at 49,842 unique roadway points.

Most bridges in the region were similarly evaluated using points assigned every 350 feet along the bridge deck; however, due to data limitations some bridge decks could not be evaluated. Up-to-date elevation data was not available for some bridges in St. Tammany and Tangipahoa Parishes. In these instances, the RPC assigned a point at each bridge approach and these were used for assessment purposes. Assessments were conducted on 4,149 unique bridge deck points and 650 unique bridge approach points. Figure 3 provides an overview of all points assessed using VAST.

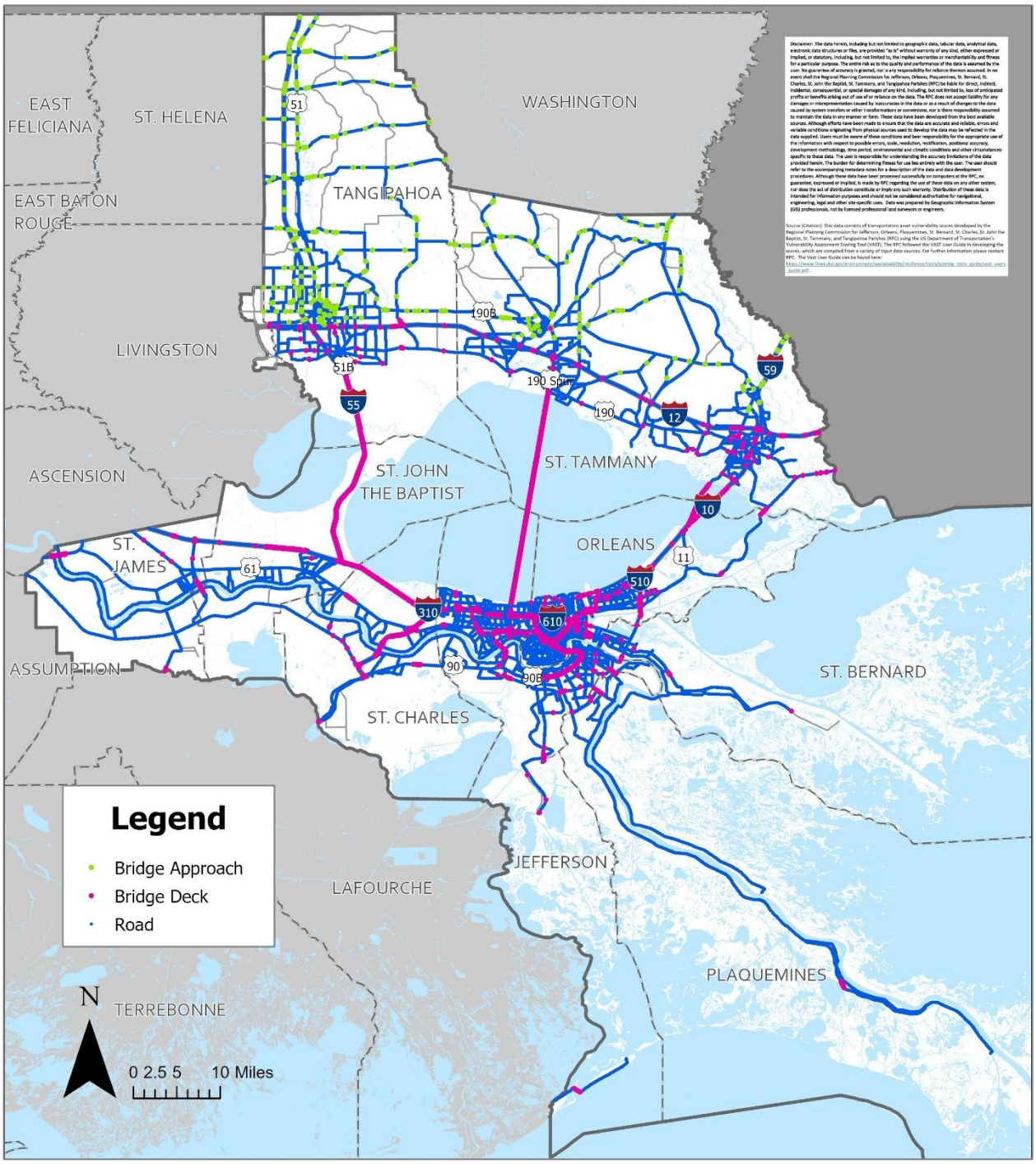


Figure 3: Road and Bridge Points Assessed in VAST

VAST Hazards

Using the parish-identified highest prioritized hazards and available datasets, the RPC considered the following five hazards in the road and bridge vulnerability assessment:

1. **Extreme heat** (high and low scenario)
2. **Precipitation** induced flooding
3. **Sea Level Rise** induced flooding (high and low scenario)
4. **Storm Surge** induced flooding (high and low scenario)
5. **Wind**

Where possible, the assessment considered two scenarios for hazards: a more severe (high) scenario and less severe (low) scenario. Separate scenarios were not considered for precipitation or wind because data that would allow differentiating between scenarios was not available.

It should be noted that while the hazards assessed in VAST are not described identically as those listed in many local hazard mitigation plans, all attempts were made to consider those priority hazards within the VAST framework. Tropical cyclones are frequently listed as a high priority hazard; however, they are associated with multiple individual hazards, including precipitation induced flooding, storm surge induced flooding, and wind. Likewise, tornadoes and thunderstorms also include multiple individual hazards. Since flooding can be caused by multiple sources, the assessment considered multiple high priority causes of flooding: precipitation, sea level rise, and storm surge.

Subsidence and coastal land loss are frequently noted as high priority hazards, but not enough data is available to create a subsidence vulnerability assessment with the VAST tool. Subsidence and other land loss related coastal hazards will be reviewed qualitatively, and the RPC will continue to investigate future datasets and parish input to determine how to include these risks in future analyses.

Finally, while it is acknowledged that extreme cold can have significant negative impacts on the transportation system, this hazard was not considered because of the low frequency of extreme cold events in the region, particularly events that may cause physical damage to transportation infrastructure. Additionally, climate projection data showed the same projected frequency of occurrence for such events across the entire region.[25]

[25] Alder, J.R. (2024). CMIP6-LOCA2 threshold and extreme event metric projections from 1950-2100 for the Contiguous United States: U.S. Geological Survey data release, https://doi.org/10.5066/P13OV6GY.

The data therefore suggests that that all roads and bridges would have the same level of exposure to extreme cold, which would lead to the VAST calculating very similar vulnerability scores for all assets to extreme cold.

Vulnerability Calculation

The overall vulnerability score is based on three major components:

Exposure: The degree to which an asset is at risk of being impacted by a hazard. How likely is it that the hazard will occur at the asset's location?

Sensitivity: The severity of a hazard's potential impact on an asset. If the asset is impacted by a hazard, how much will it be damaged?

Adaptive Capacity: The ability of the community to adapt if the hazard is damaged or destroyed. How important is the asset to the community's ability to function?

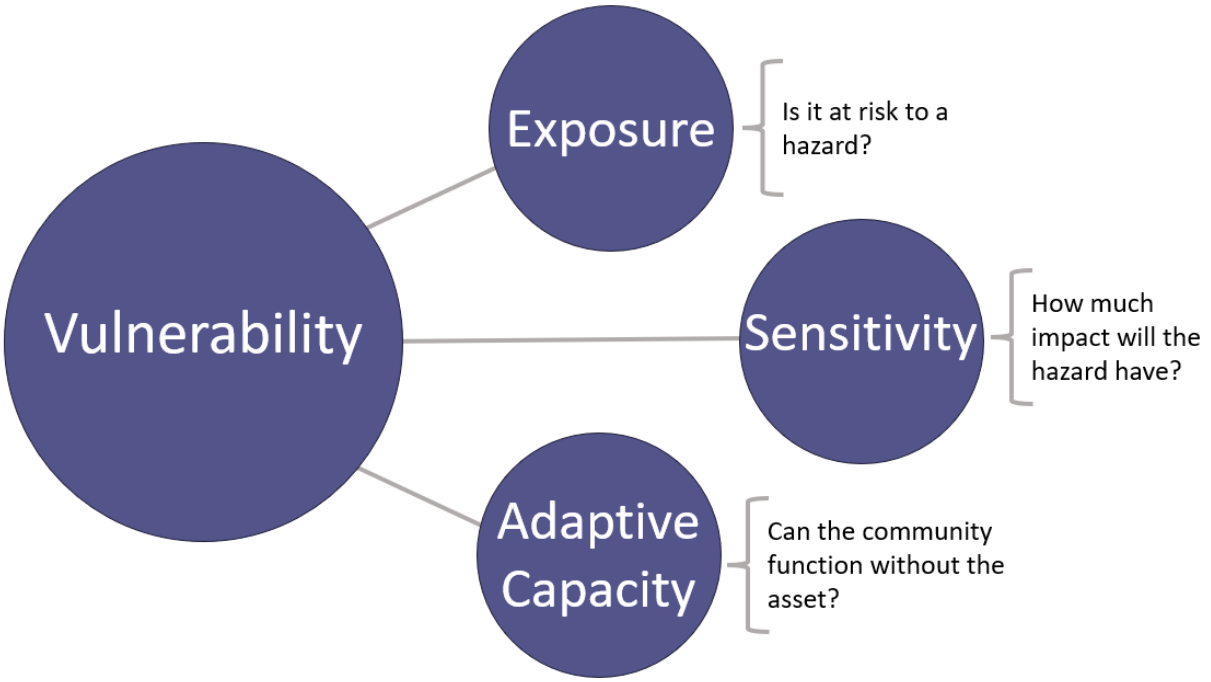


Figure 4: Components of Vulnerability

VAST calculates a score for each of these components and they are combined into a single vulnerability score. For purposes of the TRIP, the components were assumed to have equal weight, with each contributing one-third (1/3) of the total score.

The Exposure, Sensitivity, and Adaptive Capacity scores are calculated based on multiple data inputs, referred to as vulnerability indicators. Each road and bridge data point was assigned data from each indicator based on its location, condition, or other factors. When

calculating scores, certain indicators are weighted higher than others based on their potential contribution to vulnerability.

The assessment assigns scores to data points for each indicator by dividing the range of possible values into quartiles, then assigning a score of one to four to each quartile based on its impact to vulnerability. For example, assets at lower elevations may be more vulnerable to storm surge. Assets with elevations in the lowest quartile are assigned a score of four, the next lowest quartile is assigned a score of three, and so on. Some indicators, such as bridge scour rating, are not based on a numerical scale. In these instances, the RPC assigned scores to each possible value based on its potential impact to vulnerability.

The data indicators used and their relative weighted contribution to each hazard and score component are listed in Table 4. Note that Adaptive Capacity indicators were the same for all hazards. More detailed information about the indicators' data sources, rationale for inclusion, scoring, and calculation methodology can be found in Appendix B.

Table 4: VAST Indicators and Weighting

Hazard	Score Component	Indicator	Bridge Weighting	Road Weighting
Extreme Heat	Exposure	Days with Temperature over 90th percentile	100%	100%
	Sensitivity	Located on Congestion Management Network	60%	60%
		Presence of Public Transit	40%	40%
Precipitation	Exposure	Flood Zone	100%	100%
	Sensitivity	Scour Rating	50%	NA
		Elevation	50%	NA
		Repetitive Loss Per sq. mi.	NA	40%
		Propensity for Ponding	NA	60%
Sea Level Rise	Exposure	Projected SLR Inundation	50%	50%
		Proximity to Coastline	50%	50%
	Sensitivity	Elevation	25%	25%
		Type of Flood Protection	75%	75%
Storm Surge	Exposure	Projected Storm Surge Inundation	50%	50%
		Proximity to Coastline	50%	50%
	Sensitivity	Elevation	25%	25%
		Flood Protection	75%	75%

Hazard	Score Component	Indicator	Bridge Weighting	Road Weighting
Wind	Exposure	Proximity to Coastline	50%	50%
		Strong Wind Annualized Frequency	50%	50%
	Sensitivity	Presence of Overhead Utility Lines	50%	50%
		Presence of Tree Canopy	50%	50%
All Hazards	Adaptive Capacity	Located on Evacuation Route	50%	50%
		Roadway Functional Class	50%	50%

A simplified example of how VAST calculates the vulnerability of a bridge point to storm surge is illustrated in Figure 5. Exposure, Sensitivity, and Adaptive capacity are each scored based on the bridge's location and other characteristics. These are then combined to create a single vulnerability score.

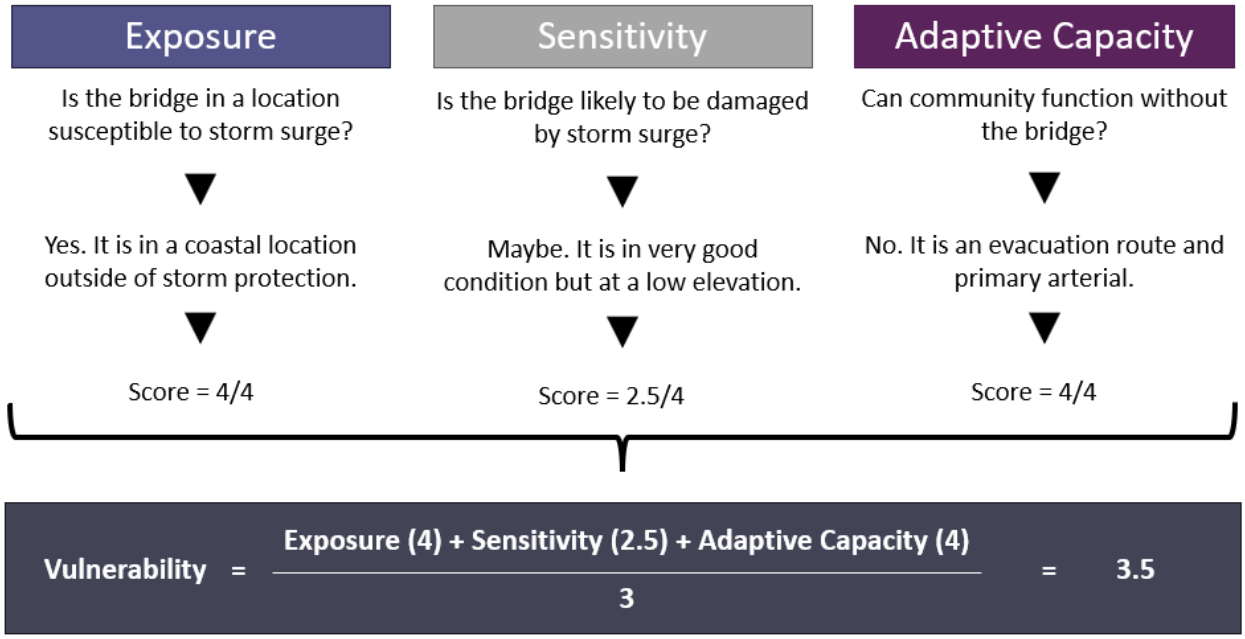


Figure 5: Simplified Example of VAST Calculation of Bridge Vulnerability to Storm Surge

It is important to note that each assessment was conducted at the parish level. Scores indicate a road or bridge's vulnerability compared to other roads and bridges within that same parish, not the region as a whole. This distinction was made due to the varying geography and development patterns across the region's nine parishes. Certain hazards may be more prevalent or impactful in some parishes than others, but this does not mean that assets in less exposed parishes are not vulnerable. For example, comparing storm surge vulnerability of a road in a coastal parish to a road in an inland parish would likely suggest that the inland road is not vulnerable to storm surge; however, storm surge can have significant impacts even in locations relatively far from the coast. The assessment therefore compares assets within the same parish to avoid obscuring potential vulnerabilities and to provide a like-for-like comparison.

VAST Limitations

Though VAST provides a quantified assessment of potential vulnerabilities, it is acknowledged that the tool has limitations. Its findings should always be reviewed and verified by local experts with knowledge of the assets and hazards in question. Vulnerability scores are calculated using multiple publicly available datasets, but these may not represent the full characteristics of a transportation asset. For example, the capacity and condition of drainage infrastructure can dramatically affect roadway vulnerability to precipitation. However, data about the characteristics of local drainage systems is frequently unavailable, incomplete, or out of date; drainage issues are therefore not considered in the VAST scores. In instances such as these, local experts can provide context, detail, and historical information that VAST cannot capture.

It should also be noted that the VAST results should not be used to compare assets in different parishes to one another, since the analysis scores assets relative to others within the same parish and not at the regional scale. Similarly, scores for one hazard should not be compared to scores for another hazard. Since the VAST uses a different set of indicators for each hazard, each with its own scoring schema, comparing the results of one hazard to another would not provide a like-to-like evaluation.

Road and Bridge Assessment Results

The road and bridge vulnerability assessment provides a method to identify, at a high level, which transportation assets may be more vulnerable to a given hazard than other assets of the same type in the same parish. Vulnerability scores can be used to quickly identify locations that may require additional evaluation, thereby informing future decision making. With vulnerability scores on nearly 55,000 road and bridge points for five different hazards, three of which were assessed for both high and low scenarios, the assessment comprises a substantial new dataset that is not intended to be summarized in a static document such as the TRIP. Rather, it will be used by the RPC and its partners in a continuing process that will inform future decision making and, importantly, be improved and refined over time.

The vulnerability assessment can be used as a screening tool to locate areas of concern across the region and prioritize them for future study. For example, Figure 6 illustrates roadway vulnerability in St. Bernard Parish to storm surge, under the high scenario. Roads with high vulnerability scores, indicated in red and orange, are potential candidates for further study. If more in-depth analyses of these locations verify the VAST's initial assessment, entities responsible for those roadways can use that information to plan actions that will reduce the vulnerabilities.

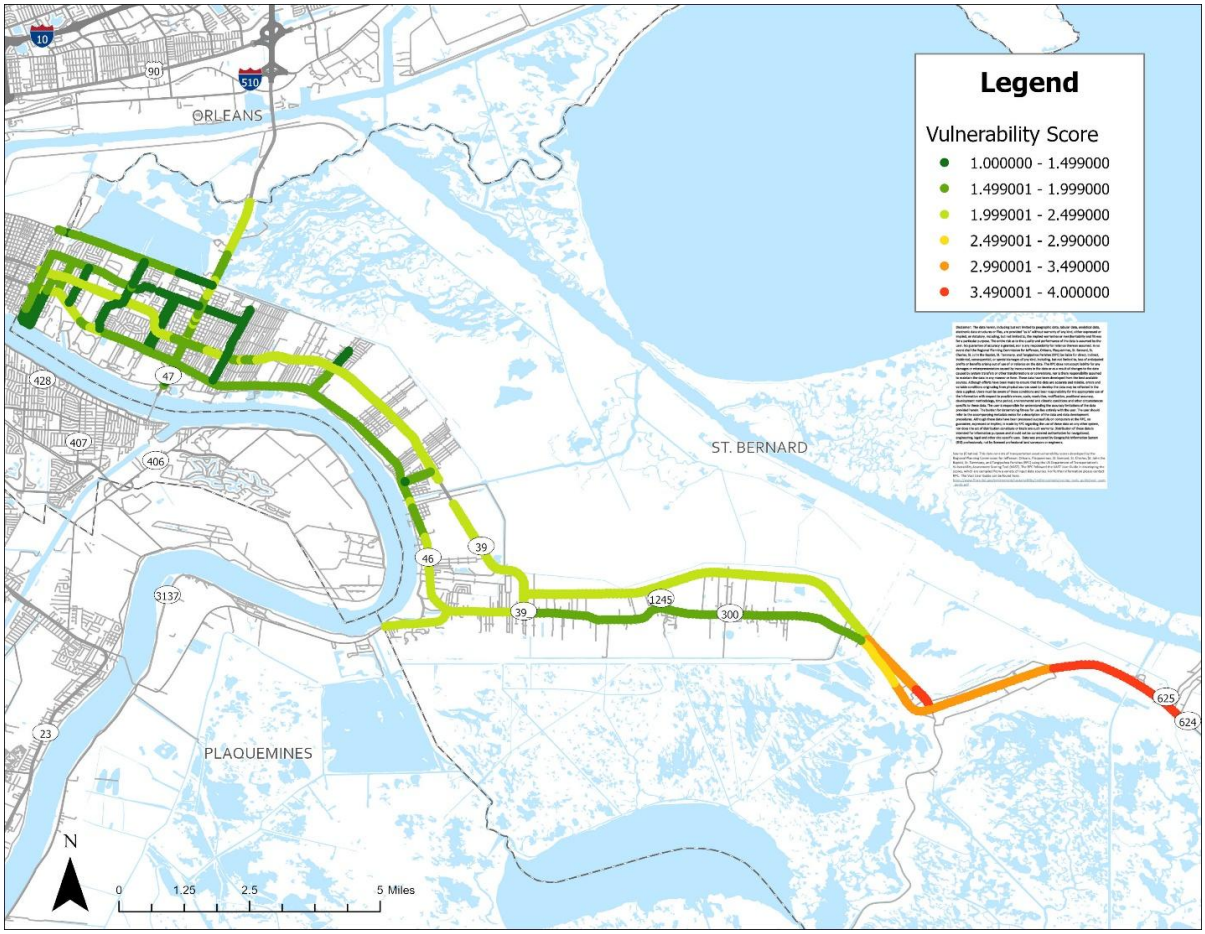


Figure 6: Road Vulnerability to Storm Surge, St. Bernard Parish

Vulnerability scores can also be used to evaluate projects in RPC's existing plans to identify opportunities for resilience enhancements, and to provide supporting evidence for resilience projects that have already been identified. For instance, the Regional Freight Mobility Plan, adopted in 2022 and incorporated into the MTP, recommends the elevation of I-10 near Irish Bayou in Orleans Parish to mitigate potential flood risk. During the Freight Plan's development process, stakeholders identified this location as potentially vulnerable to flooding due to its elevation, close proximity to Lake Pontchartrain, and lack of flood protection. This stakeholder input is supported by the VAST results, as the road

points on I-10 closest to Lake Pontchartrain exhibit vulnerability scores for all types of flooding that are substantially higher than the Orleans Parish average (see Table 5). These findings not only confirm local expertise, but may also aid in the project's implementation by enhancing its eligibility for funding. The elevation project listed in the Freight Plan does not currently have funding identified; however, the vulnerability assessment results may provide additional justification for future funding should it become available.

Table 5: VAST Scores, I-10 at Lake Pontchartrain vs. Orleans Parish Average

Location	Precipitation Vulnerability Score	Sea Level Rise (High Scenario) Vulnerability Score	Storm Surge (High Scenario) Vulnerability Score
I-10 at Lake Pontchartrain, Eastbound	3.0	3.3	3.7
I-10 at Lake Pontchartrain, Westbound	3.0	3.3	3.7
Orleans Parish Average	1.8	2.0	2.0

The RPC also intends to use the assessment results to inform and provide additional context to its corridor and sub-area studies. Such studies are an important part of the RPC's metropolitan transportation planning process and are often the first opportunity to formally define problems at specific locations and develop potential solutions. The RPC is increasingly using this type of work to address multiple concerns in a single study. While a study may be initiated to address a specific issue such as congestion, the resulting analysis often results in recommendations for improving additional areas of concern like safety or pedestrian access. In this same vein, the RPC now requires that many studies consider hazard vulnerabilities and potential resilience enhancements along with other improvements. As these studies are completed the VAST results will provide a valuable tool to identify locations of concern that may require additional evaluation.

Finally, the RPC intends to make further use of the assessment results in other planning processes moving forward. The scores will be made available to local government partners to aid in their own analyses, strengthening local decision making. It is also anticipated that the TRIP and its associated assessments will be incorporated into the MTP, furthering RPC's commitment to planning for resilience. The data may also be useful in related efforts such as the upcoming Louisiana Watershed Initiative Regional Watershed Plan. As the RPC continues to gather local feedback on the assessment results, it will also regularly update the analysis with input from subject matter experts.

Non-motorized Facilities

Infrastructure such as sidewalks, bike lanes, and mixed-use paths play a critical role in facilitating non-motorized transportation by providing safe travel options for people walking and biking. Assessing the vulnerability of these facilities to hazards can be

challenging due to data limitations. Though the RPC is continually improving its regional inventory of non-motorized facilities, it is not yet comprehensive enough to allow for a quantitative vulnerability assessment such as the VAST. Even when location and infrastructure type data is available, it rarely includes information about condition or other characteristics that are required for an in-depth analysis. The VAST can provide valuable information about a facility's vulnerability if those assets are located on, or directly adjacent to roads and bridges. In other instances, such as off-street paths and trails, the RPC must rely on stakeholder input to identify and document non-motorized infrastructure that is at risk. Despite these limitations, vulnerabilities specific to non-motorized facilities can be identified:

Users: People walking and biking are inherently more exposed to hazards than those traveling in motorized vehicles. In the event of a hazard, they have limited protection from harm and are therefore highly vulnerable. These characteristics are exacerbated by the fact that many people who are dependent on non-motorized transportation also exhibit other vulnerabilities, such as age and disability.

Protection: Non-motorized facilities frequently lack protective features that may mitigate hazards on other types of transportation infrastructure. For instance, off-street paths and sidewalks often do not have dedicated drainage like roads do. Without such features, hazards may have more severe and longer lasting impacts to non-motorized facilities.

Design Standards: Since walking and biking is a less intensive use of infrastructure than carrying motor vehicles, non-motorized facilities usually have lower design standards than roads and bridges. For example, the pavement thickness for a sidewalk is considerably less than a roadway. While such design is reasonable under most circumstances, it does result in non-motorized infrastructure that may be more easily damaged by extreme events than other transportation assets.

Maintenance: Non-motorized infrastructure, especially off-street facilities, may be maintained less frequently than other transportation assets. Agencies responsible for infrastructure maintenance may prioritize the repair and replacement of facilities that are more intensively used and degrade more quickly. Aging, poorly maintained facilities may be more likely to be damaged by hazards than assets that are in a state of good repair.

Public Transit

The majority of public transit in the region is provided by bus or, in the case of some demand-response providers, smaller shuttles or vans. The RTA also operates a streetcar network, and both the RTA and Port of Plaquemines provide ferry service on the Mississippi River.

The transit vulnerability assessment was completed by synthesizing input received at a series of workshops and one-on-one meetings held with local transit operators. The priority assets, hazards, and vulnerabilities reflect the unique role public transit serves in

the community as well as the complexity of its operation.

Transit Assets

Transit operators own and maintain a variety of asset types, including vehicles, infrastructure, facilities and equipment:

Vehicles: In addition to buses, streetcars, ferries, and other passenger vehicles, most transit operators maintain fleets of support vehicles such as maintenance trucks and transit police cruisers.

Operations Infrastructure: Transit vehicle operations are dependent upon supporting infrastructure, much of which is not directly maintained by the agency to facilitate their use and rider access. Buses operate on public roadways, while streetcars travel on rails that may be located in the shared public roadway or the neutral ground. Streetcars also require overhead catenary wires and poles for electric service. Ferries utilize docks, access roadways, and gangways. Most transit providers also maintain multiple passenger terminals and shelters with varied sizes and amenities. Importantly, most transit trips begin and end with a walking or biking trip to or from the transit stop; therefore, facilities that support safe and easy access for people walking and biking are critical to transit operations.

Support Facilities and Equipment: In addition to public facing vehicles and infrastructure, transit operators also rely on support facilities and equipment to maintain operations. These can include vehicle storage lots, maintenance buildings, administrative offices, communication equipment, and backup power generators.

Priority Hazards and Vulnerabilities

During discussions with the RPC, transit stakeholders focused on a common set of themes when discussing vulnerability: the safety of riders, vehicle operators, and support staff; service interruptions; asset damage; and reliance on outside systems and assets. In describing these vulnerabilities, stakeholders identified specific priority hazards, including flooding and extreme heat, as well as operational impacts that could be caused by multiple hazards:

Flooding: Most frequently caused by extreme precipitation and storm surge, flooding can have multiple impacts on public transit. Due to flooding's prevalence and effects, stakeholders identified it as their highest priority hazard. Floodwaters can damage vehicles, facilities, and equipment, but also threaten safety and operations. If flooding occurs while vehicles are operating, such as during a flash flood or in flood-vulnerable locations like underpasses, passengers and operators may be in danger if water enters the vehicle. Moreover, if vehicles cannot travel along or across flooded roadways, service can be delayed by necessary detours or interrupted entirely if no alternate routes are available. Critically, flooding can also have impacts to transit even if the transit routes and facilities themselves are not threatened. When flooding occurs across a wide geographic

area, travelers may be blocked from accessing transit routes. Not only does this restrict the public's ability to use transit, but it may also put individuals in danger of harm as they attempt to travel. The relationship between flooding and access to transit highlights an important aspect of transit vulnerability: even when transit assets themselves are not threatened, impacts to other systems and assets may severely impact safety and operations.

Extreme Heat: High temperatures were also frequently cited as a major concern by transit stakeholders. Vehicles, particularly buses, are vulnerable to extreme heat as it increases maintenance needs and can lead to breakdowns. This can disrupt transit service but also increases costs and requires transit providers to have additional vehicles available in case of vehicle failure. If vehicle climate control systems break during extreme heat, this can also disrupt service because an otherwise functioning vehicle cannot comfortably carry passengers. More importantly, a lack of adequate shade or cooling for riders traveling to routes or waiting at stops can cause heat-induced health problems, particularly for the elderly, young children, and people with certain medical conditions.

Multi-Hazard Operational Vulnerabilities: In addition to impacts caused by flooding and extreme heat, transit stakeholders described impacts and vulnerabilities that can be caused by multiple hazards.

Power Loss: Typically caused by wind events or extreme temperature, loss of electric power can impact transit operations regardless of the outage's cause. Streetcars operate on electricity, and in the case of a blackout routes can be partially or totally disabled. Loss of power at passenger facilities, particularly ferry terminals, can similarly impact service by reducing or eliminating the facility's functionality. Operational and maintenance facilities may have limited access to backup power in case of an outage, limiting transit operators' ability to manage their systems. All of these impacts are further exacerbated by extended outages, which in the case of major events like hurricanes can last days or weeks.

Communications Disruptions: Damage or disruption to communication infrastructure often occurs concurrently with power outages, but can also happen independently as a result of wind, flooding, and other hazards. Transit service can be interrupted if operations centers, support staff, and vehicles cannot communicate with each other. This is particularly problematic during a hazardous event such as extreme precipitation, when emergency alerts need to be conveyed quickly and accurately to help vehicle operators avoid dangerous situations. Functioning communication systems are also critical to inform riders about service disruptions and hazardous conditions traveling to or from transit stops. Loss of this ability can leave travelers cut off from service or stranded, a problem that is especially concerning for populations that are dependent on safe access to transit.

area, travelers may be blocked from accessing transit routes. Not only does this restrict

Evacuation Considerations: Some transit operators assist state and local governments during evacuation events, typically prior to a hurricane landfall. In these instances, transit agencies provide vehicles, drivers, or facilities to help transport residents to a safe location. While these activities are critical in the face of a major event, they put transit staff and assets at risk. Staff working the evacuation event require safe spaces to work and rest; otherwise, they face the same risks they are helping other people avoid. Moreover, transit assets experience additional exposure to hazards as they are actively in use ahead of an event to aid in disaster preparations rather than being in advance.

Infrastructure Concerns: Transit stakeholders frequently cited aging and inadequate infrastructure as compounding factors to other vulnerabilities. Vehicles that are near the end of their useful life are more likely to be impacted by extreme heat, as are aging electrical and communications systems. Updated technologies such as flood warning alerts and automated emergency messages can expedite response to hazardous events. As mentioned previously, transit vulnerability is often dependent upon assets and systems that are not under the control of transit agencies. The age and condition of roadways, bridges, drainage systems, and the electric grid can greatly affect their functionality, directly impacting how hazards will affect public transit.

Ports

The movement of freight through the region is a critical part of the region's transportation system and economy. Due to its location on the lower Mississippi River, the region moves bulk products and containerized cargo through multiple ports.

The port vulnerability assessment was completed by synthesizing input received at a series of workshops and one-on-one meetings held with port representatives. The hazards and vulnerabilities described by stakeholders include some themes common with other transportation modes, while others highlight concerns that are specific to port facilities.

Port Assets

Perhaps more than any other mode, ports rely on a wide variety of asset types. The assets described below are not an exhaustive list of those needed to operate a port, highlighting the complexity of assessing port vulnerabilities to hazards.

Maritime and Waterside Infrastructure: Ports are host to a wide range of maritime vessels, including major cargo ships, tugboats, and barges. In addition, ports use a complex array of systems and equipment to facilitate the interface between vessels and landside facilities. These include docks, wharves and piers, and the waterways themselves. While ports do not typically own waterways, their condition can critically impact port operations.

Cargo Handling Equipment and Infrastructure: Moving cargo to and from vessels requires cranes, tractors, stackers, and bulk handling equipment, among many others. The storage and transfer of cargo on the landside also requires warehouses, container yards, and staging areas.

Supporting Facilities: Most ports maintain a system of internal roadways and rail. They are also supported by administrative, maintenance, and operations buildings, as well as utility infrastructure such as fueling depots and dedicated electrical systems. Finally, ports are supported by both land and maritime vehicles such as trucks and fire boats.

Priority Hazards and Vulnerabilities

Hazards that disrupt port operations can have a significant impact on the regional economy, especially if port operations are suspended for long periods of time. In addition, ports can play an important role in emergency response, providing an important point of entry for supplies and personnel. The hazards and vulnerabilities identified by port stakeholders reflect the complex network of infrastructure, facilities, and equipment required to maintain operations.

Flooding: As with other modes, freight stakeholders cited flooding as a hazard of major concern. While flooding from precipitation impact ports, storm surge and sea level rise pose a greater threat for facilities located directly on waterways and outside of flood protection systems.

Wind: Ports can be significantly impacted by both extreme wind events and more frequent high winds as gusts over 35 miles per hour can disrupt crane operations. Strong winds can also blow over stacks of containers and threaten ships at dock.

Temperature: The exposed nature of many port facilities makes them vulnerable to extreme temperatures, particularly cold. The Port of New Orleans has shut down twice in recent years due to cold weather.

River Height and Velocity: Most of the region's port facilities are highly dependent on Mississippi River conditions. Above normal river heights and velocities can endanger maritime vessels while also preventing necessary maintenance of docks, wharves, and other facilities. In some instances, regulatory authorities such as the Army Corps of Engineers may prohibit certain maritime activities to protect life, property, and critical flood protection infrastructure.

Power Outages: Similar to public transit operators, port stakeholders indicated that power outages are a critical concern. Caused by a variety of different hazards, power outages can severely impact port operations for extended periods of time.

Airport

As a major tourist destination and the largest metropolitan area in the state, the nine-parish region experiences substantial air passenger travel and air cargo movements.

This assessment is based on input from stakeholders representing LANOIA. While several other airports exist across the region, LANOIA is the primary point of entry for most air passengers and freight to the region. Due to its air traffic volume, impacts to this facility are more likely to have repercussions across the region than impacts to other smaller-scale airports. Regardless of traffic and scale, it is likely that many of the hazards and vulnerabilities identified by LANOIA stakeholders also apply to other airports that serve the region and provide necessary air traffic operations.

Airport Assets

Similar to ports, airports rely on a complex system of infrastructure, equipment, and facilities to safely and efficiently facilitate air travel.

Airside Infrastructure and Equipment: Airports host a variety of aircraft and support vehicles, and contain numerous facilities and equipment types that support air travel. Some infrastructure, such as runways, taxiways, and fuel depots, interact directly with aircraft. Others, such as air traffic control towers, emergency response systems, and communication equipment are vital to the airport's operations and support multiple assets within the airport's facility.

Landside Infrastructure and Equipment: In addition to the systems necessary for operating air travel, airports are comprised of assets that facilitate passenger travel and freight movements. Passengers are accommodated by infrastructure such as terminal buildings, baggage handling equipment, and ground transportation facilities. Air cargo is supported by loading and unloading equipment, specialized terminals, and storage facilities. All of these rely on a system of internal roadways, utilities, and drainage systems.

Priority Hazards and Vulnerabilities

Airports are at risk to many of the same hazards as other transportation assets across the region. However, given airport infrastructure's critical role in ensuring safe aircraft operations while also ensuring the efficient arrival of passengers and cargo, the potential impacts of hazards to airports are distinct from other asset types.

Flooding: During extreme precipitation events, floodwaters may damage airport facilities and pond on runways, impacting air travel. More critically, flooding can severely affect surrounding roadways, preventing passengers, freight, and staff from accessing the airport. Stakeholders also noted that the Lakefront Airport in New Orleans, which is located directly on the shore of Lake Pontchartrain, is likely to be severely impacted by storm surge and sea level rise.

Wind: Some airport facilities, including the main terminal at LANOIA, are hardened against wind damage, while other support facilities such as hangers and plane tie downs

may be more at risk of wind damage. More critically, extreme winds can lead to air travel restrictions, thereby impacting airport operations. Finally, critical infrastructure such as electric utilities and communication equipment is highly susceptible to wind damage.

Tropical Cyclones: In addition to flooding and wind and flooding vulnerabilities described above, tropical cyclones can be particularly impactful on airport operations. As the primary point of entry for many visitors to the region, LANOIA can be inundated with passengers attempting to leave the region in the event of an evacuation. Moreover, emergency relief personnel and staff often fly into LANOIA before and after major events such as hurricanes.

Subsidence: Stakeholders noted that LANOIA is currently experiencing subsidence in some locations and is working on mitigation, with some building foundations and drainage systems already impacted. Perhaps most importantly, subsidence can damage runways and affect their usability.

Extreme Temperatures: Cold weather events can impact an airport's ability to handle flights, particularly in a region not accustomed to below-freezing temperatures. Due to the rarity of such events, LANOIA possesses limited equipment for handling extreme cold such as snowplows and de-icing equipment. Extreme heat can also endanger ground transportation personnel, who are highly exposed while working in an unshaded, paved environment. While LANOIA has not experienced runway pavement damage from extreme heat, stakeholders noted that this has occurred in other major airports around the country and is a possibility at LANOIA.

Linking Vulnerability Assessments

Relating the assessments of different asset types yields a more comprehensive understanding of transportation vulnerability. Disruptions to one asset type can have ancillary effects on the operation of other assets, meaning that even if an asset is not vulnerable to a particular hazard, it could still be affected because of how that hazard impacts another asset. For example, transit operators noted extreme heat as a high priority hazard because it can endanger the health of riders traveling to transit stops and increases the likelihood of vehicle breakdowns. Airport stakeholders stated that extreme heat is not a major concern for LANOIA operations; however, if travelers and workers are unable to access the airport via public transit, airport operations could be disrupted. The interrelated nature of the transportation system means that addressing vulnerabilities for some assets can benefit the system as a whole.

The road and bridge assessment may provide particularly valuable information about system-wide vulnerabilities. Public transit, ports, and airports all rely on roads and bridges for their operations. Transit vehicles use public roads and bridges, as do trucks traveling to and from ports and travelers accessing the airport. Identifying vulnerabilities on roads and bridges that carry transit routes, or provide access to ports or airports, can

help prioritize locations for further study. For example, Figure 7 shows roads and bridges analyzed by VAST that also carry RTA, JP Transit, or SBURT routes. Transit operators seeking to improve the resilience of their systems can use VAST scores to identify locations of concern, further evaluate their vulnerabilities, and develop solutions to mitigate risks.

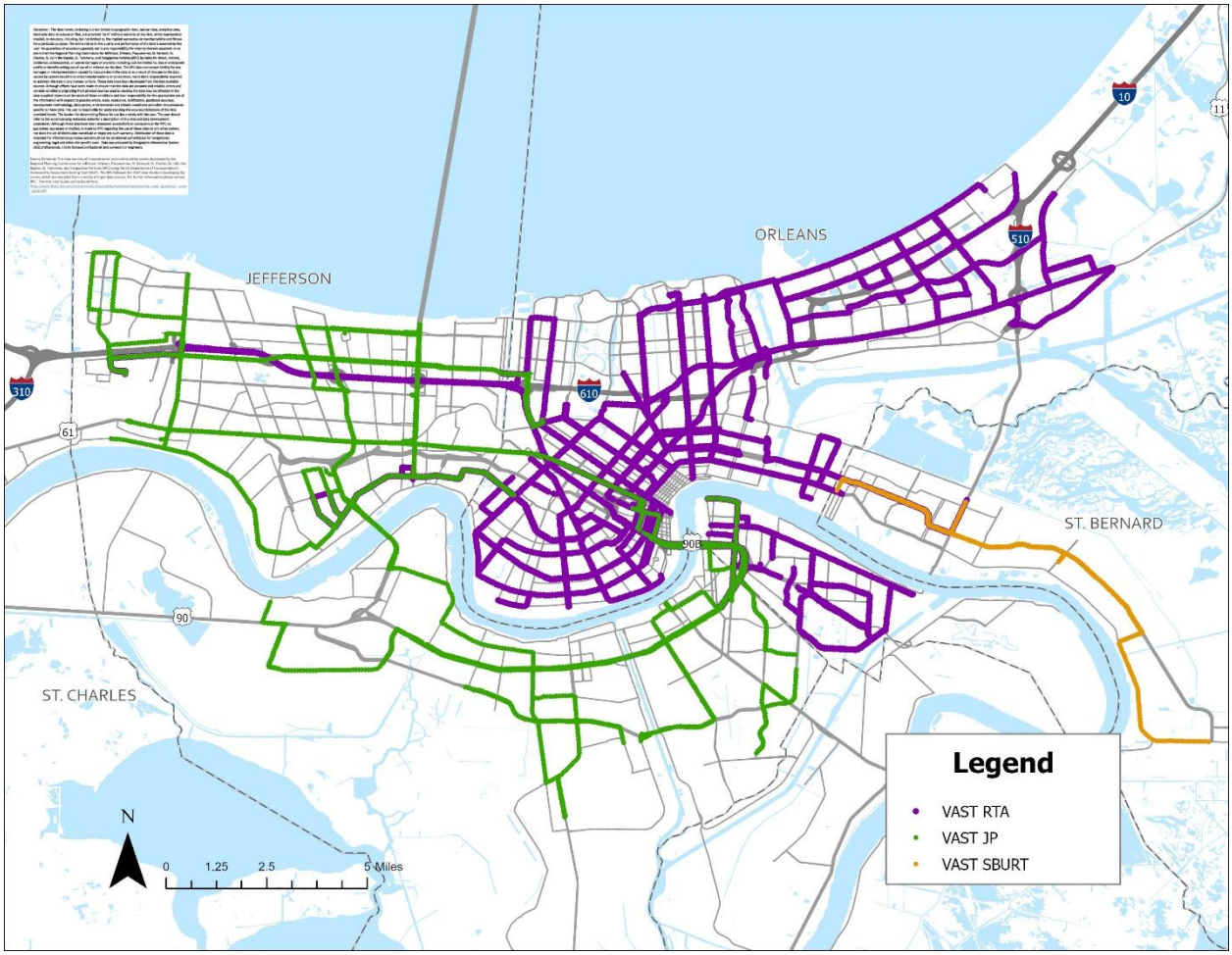


Figure 7: VAST Road and Bridges that Carry RTA, JP Transit, or SBURT routes.

Using the Assessment

The transportation vulnerability assessment provides RPC with a much more nuanced understanding of potential risks to the regional transportation system. The results of the assessment will aid the RPC's ongoing metropolitan planning process. They will be incorporated into other planning efforts such as the Congestion Management Process, Freight Mobility Plan, and especially the MTP. The next version of the MTP is anticipated to be adopted in 2026, and the vulnerability assessment will be used to shape the priorities outlined in that document. The assessment will also be used to inform and provide additional context to the RPC's feasibility studies. These efforts are an important opportunity in the planning process to identify locations and assets that may require further investigation for potential resilience improvements. Finally, the assessment provides data that may be used by the RPC and its partner agencies to identify specific projects for addressing vulnerabilities.



4 Recommendations

Recommended Strategies

Stakeholder input and the risk-based vulnerability assessment provide a basis for identifying actions that will improve the ability of the region to respond promptly to the impacts of hazards and to be prepared for changing conditions. The TRIP recommends two types of activities to address regional resilience: strategies and priority projects.

Strategies

Strategies are non-location-specific actions that can be implemented by local or state agencies with or without RPC participation. The RPC identified six categories of strategies that can help reduce the impacts of natural hazards. These strategies address reducing impacts on transportation assets directly by updating or improving the transportation infrastructure, or indirectly by impacting systems that affect the transportation network such as a surrounding waterways or ecosystems. These six categories were selected based on reviewing PROTECT guidelines and awarded PROTECT projects, reviewing national TRIP plans and proposed strategies, and input from local governments and public entities. The strategies also consider the six transportation asset types included in the TRIP.



Definition: Projects that focus specifically on using natural mechanisms to reduce risk for multiple assets. Nature-based solutions include projects commonly referred to as green infrastructure.

Examples: Wetland restoration, tree plantings for reduced heat and flood control, bioswales and retention areas, controlled burns or fire suppression mechanisms, installing impermeable pavement, increasing impermeable surfaces, sediment diversions and land building, installing pavement cooling technologies, invasive species control.

Nature-based solutions such as wetland restoration to address flooding or increased tree plantings to reduce the heat island affect can increase resilience and reduce risks associated with multiple hazards. Much of the region has started to adopt nature-based solutions such as green infrastructure to address flooding in response to concerns over subsidence and to increase the capacity of existing human-built systems designed to capture and remove flood waters (sometimes referred to as grey infrastructure). Many of these strategies also include co-benefits, such as capturing greenhouse gas emissions through increased tree plantings and restoring wetlands, amending soils and filtering water run-off, reducing air pollution, and increasing natural habitats and ecosystems for native plants and wildlife. These strategies can also be directly tied to transportation assets such as the addition of bioswales along roadways or increased permeable pavement to immediately relieve stormwater runoff. They may also be applied to sites further from a transportation asset that helps reduce flooding.



Definition: Projects that focus exclusively on controlling stormwater or floodwater. May include grey infrastructure as opposed to nature-based solutions, or a combination. While flood control measures may overlap with other strategies, their focus should be primarily on controlling flooding not addressed solely with a nature-based solution.

Examples: Seawall/barrier construction, storm surge control mechanisms, culvert improvements, drainage improvements that may or may not include roads but have an overall positive impact on the transportation network, floodwall and seawall improvements, levee improvements or new levees, shoreline reconstruction, installation or improvements to drainage systems and culverts.

While strategies for nature-based solutions can still reduce flood risks, flood control measures focus on controlling storm or floodwater though grey infrastructure, or a controlled mechanism. Many of these projects may not be directly associated with the transportation system but will reduce flood risks on roadways during flood events. Drainage improvements and levee maintenance and repairs to the surrounding waterways will impact the transportation network by reducing flood risk for the entire surrounding area and infrastructure.



Transportation Asset and Infrastructure Improvements

Definition: Projects that enhance or protect existing transportation assets such as roads, bridges, transit, airports, or ports but also build resilience or respond to future risks and hazards.

Examples: Enhancing bridge design, increasing bridge freeboard clearance, elevating roads, elevating vulnerable and low-lying bridges, re-designing roads to accommodate current and future risks, repairing and resurfacing roads with weather resistant pavement types, re-routing transit lines, hardening transit buildings, weather-proofing key transportation buildings, erosion control along roadways, elevating transportation electrical and mechanical equipment, transit stop shelters and improvements, relocating roads, bridges, or high-trafficked corridors, hardening electric grids and installing backup power for transit, port, and airport facilities, communication infrastructure upgrades.

Transportation asset and infrastructure improvements will include direct impacts and changes to transportation infrastructure. While this plan reviews the vulnerability of six transportation assets, any proposed transportation improvement that reduces risk and vulnerability to the transportation network enhances transportation resilience.



Emergency Management and Disaster Recovery

Definition: Projects that help aid in the preparation for disasters or the direct recovery from their impacts.

Examples: Disaster alerts systems on bridges, roadways, or in response to flooding, improvements to evacuation routes, improvements and increases in signage, evacuation route redundancy, increase in evacuation pickup spots and signage, roadway improvements that directly improve evacuation routes, widening roads to allow for shoulders for emergency evacuations.

In a region that sees seasonal evacuation orders for tropical weather and routine flooding, many of the prioritized strategies include improvements that aid in evacuation, the post-disaster recovery process, or protecting the community from flooded roadways.

As the nature of emergency management and disaster recovery involves assets such as personnel, moveable property and equipment, and additional critical services, these strategies may include non-infrastructure assets. These strategies also consider vulnerable populations and how transportation infrastructure, including transit, can together aid in evacuation and recovery. State and local agencies are responsible for designating evacuation routes and overseeing evacuation operations, including efforts to evacuate people who do not have access to a vehicle. As such these strategies will require coordination across agencies and jurisdictions, which can be facilitated through RPC's work, especially when planning new projects for implementation.

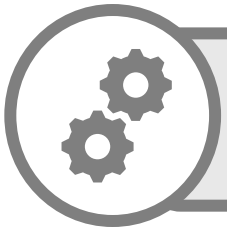


Planning

Definition: Proposals to study or plan for future resilience improvements.

Examples: Plans or studies for future resilience improvements, feasibility studies to determine the best resilience projects, increased hazard mitigation and evacuation planning, plans and studies that help determine ways to protect critical assets, drainage and stormwater master plans.

Planning for resilience improvements to the transportation network should continue beyond the TRIP. RPC plans to include resilience measures in much of its future planning work, including future MTP updates. Many of the proposed infrastructure strategies and projects in the plan will need additional studies prior to implementation. Additionally, local entities should conduct their own resilience studies or incorporate vulnerability assessments into additional planning projects to ensure infrastructure can withstand future weather risks. Master plans for assets that support or directly affect transportation assets, such as stormwater master plans, will help an entity understand current and future flood needs.



Monitoring and Maintenance

Definition: Monitoring existing assets and providing routine maintenance can ensure proper performance from transportation assets and identify issues before an infrastructure failure, reducing their vulnerability during disasters.

Examples: Asset management systems for infrastructure, performing routine asset inspections and corresponding maintenance.

To ensure that current transportation assets are protected and work as designed during all hazards, routine monitoring and maintenance should be a critical part of transportation resilience. Future projects should include maintenance and repair plans to ensure assets continue to perform and infrastructure failures do not increase the severity of a natural disaster.

Priority Strategies

Strategies prioritized in this plan, and listed in Table 6, come from consulting with stakeholders through workshops, survey feedback, and both virtual and in-person meetings to help identify community resilience needs and existing proposed projects. While the priority project list identifies specific projects currently planned in the region, the strategy recommendations provide broader guidance for the region to identify future projects. All prioritized strategies align with the six categories strategies identified by the RPC and either directly improve one transportation resilience.

Table 6: Priority Strategies

Project Type	Example Project(s)	Corresponding Climate Hazards	Benefits and Proposed Measures
Nature-Based Solutions	Restoration of Natural Systems	Precipitation, Storm Surge, Sea-Level Rise	Restore natural systems such as surrounding wetlands and ecosystems, and land from coastal and erosion to help absorb weather impacts and protect infrastructure.
Nature-Based Solutions	Green Infrastructure to Support Grey Infrastructure	Precipitation, Storm Surge, Sea-Level Rise	Include green infrastructure projects alongside grey infrastructure that encompass the entire transportation network including sidewalks, curbs, and parking areas. Improvements could include bioswales along road medians and sidewalks with permeable pavement to catch stormwater runoff on roads.
Nature-Based Solutions	Tree Canopy Restoration	Precipitation, Extreme Heat	Restore urban and rural tree canopies and increase vegetation to reduce the urban heat-island affect and help absorb storm and flood waters and further increase permeability
Flood Control Measures	Upgrade and Expand Pumping Stations	Precipitation, Storm Surge, Sea-Level Rise	Upgrade existing pump stations, including back-up power of pumping stations to aid in forced drainage of roadways during flood events and add stations or equipment where increased flooding occurs.

Project Type	Example Project(s)	Corresponding Climate Hazards	Benefits and Proposed Measures
Flood Control Measures	Parish and City-Wide Drainage Improvements	Precipitation	Increase drainage improvements throughout the region that prioritizes the most flood-risk and flood-prone areas to reduce flooding on adjacent roadways.
Flood Control Measures	Drainage Improvements at Underpasses	Precipitation	Installation of a mix of drainage improvements specifically at underpasses to help remove, detain, or retain flood waters and reduce traffic emergencies during flood events.
Flood Control Measures	Equipment Elevation	Precipitation, Storm Surge	Elevate critical infrastructure and equipment to aid in ongoing and post-disaster recovery.
Transportation Asset and Infrastructure Improvement	Cool Pavement Technologies	Extreme Heat	Install cool pavement technologies such as coating streets, sidewalks, and buildings to reduce reflective heat.
Transportation Aset and Infrastructure Improvement	Public Water Fountains	Extreme Heat	Install more public water fountains and increase access to potable drinking water to alleviate extreme heat for transit users and cyclists and pedestrians.
Transportation Asset and Infrastructure Improvement	Utility Hardening	Wind, Extreme Heat	Harden and improve existing power distribution lines and poles to reduce downed lines on roads and decrease outages and service disruption. Prioritize areas that include critical community assets in addition to key transportation assets such as transit facilities, ports, and airports.
Transportation Asset and Infrastructure Improvement	Transit Shelters	Temperature, Precipitation	Provide shelter for transit users to protect from extreme heat and precipitation.

Project Type	Example Project(s)	Corresponding Climate Hazards	Benefits and Proposed Measures
Transportation Asset and Infrastructure Improvement	Waterline Improvements	All hazards	Upgrade or install new waterlines and drinking water facilities throughout parishes to ensure access to potable water during hazards such as flooding or droughts.
Transportation Asset and Infrastructure Improvement	Road and Bridge Elevations	Precipitation, Storm Surge, Sea-Level Rise	Raise roads and bridges throughout the region that have an increased flood risk due to current and future flood events.
Transportation Asset and Infrastructure Improvement	Facilities Upgrades	All hazards	Upgrades to existing facilities that house key infrastructure such as transit, post-disaster recovery efforts, and critical staff.
Emergency Management and Disaster Recovery	Flooded Roadway Barriers	Precipitation	Install temporary barriers to prevent vehicles from entering flooded roadways.
Transportation Asset and Infrastructure Improvement	Communications Equipment	All hazards	Update communications equipment to allow for real-time information sharing within and between transit agencies, ports, airports, local governments, and other agencies responsible for transportation assets
Emergency Management and Disaster Recovery	Flood Monitoring Signals	Precipitation	Install flood alert systems at flood prone roads to alert drivers and reduce flood traffic emergencies.
Emergency Management and Disaster Recovery	Upgrades to Evacuation Routes	All hazards	Prioritize the improvement or addition of roads and bridges along key evacuation routes to ensure safer and more efficient evacuations.
Emergency Management and Disaster Recovery	Improve Evacuation Route Signage and User Information	All hazards	Improve signage on evacuation routes, by both adding more signage and improving existing signage to better inform evacuating travelers.

Project Type	Example Project(s)	Corresponding Climate Hazards	Benefits and Proposed Measures
Emergency Management and Disaster Recovery and Planning	Post Disaster Recovery Plans	All hazards	Create a plan for populations returning after an evacuation order that includes communications, resources, transportation asset needs, road and debris cleaning, and mutual aid following disasters.
Emergency Management and Disaster Recovery	Transit Assisted Evacuations	All hazards	Improve evacuation with transit by utilizing paratransit buses and gathering data on who needs assisted evacuation.
Planning	Green Infrastructure Tool-Kit	All hazards	Create a nature-based green infrastructure tool kit tailored to the region with a suite of potential strategies for local entities to better incorporate green infrastructure into on-going transportation planning.
Planning	Hazards and Risk-Based Land Use Studies	All hazards	Perform land use studies with updated hazards data to better inform land use patterns and promote development in less risk-prone areas.
Planning	Codes, Standards, Plans, and Regulatory Framework Inventory	All hazards	Update the RPC's 2019 Regional Transportation Resilience Analysis to document recent resilience-related efforts by state and local partners.
Planning	Align Transportation Resilience Planning with Resilience of other Community Assets	All hazards	Identify opportunities to align the findings and recommendations of this plan with efforts by partner agencies to enhance the resilience of other community assets such as buildings, housing, emergency management, and energy, water, and communications infrastructure.

Project Type	Example Project(s)	Corresponding Climate Hazards	Benefits and Proposed Measures
Planning	Stormwater Master Planning	Precipitation, Storm Surge	Create stormwater master plans for parishes and cities that identify current and future flood needs and outline location and project specific mitigation strategies.
Monitoring and Maintenance	Road and Bridge Concrete and Steel Rehabilitation	All hazards	Perform assessments of existing roads and bridges to determine repair needs to protect against hazards and extend their longevity.
Monitoring and Maintenance	Asset Management Programs	All hazards	Establish plans and policies for monitoring asset age and condition, and for maintaining and replacing assets on an appropriate schedule, to ensure they operate safely and effectively in hazardous conditions.

5 Priority Projects

Priority Project Identification

The TRIP includes a list of prioritized transportation resilience improvement projects in Appendix C. These projects are located throughout the region and include both grey infrastructure and natural solutions. It is anticipated that the projects listed herein will be the primary mechanism for improving the resilience of the transportation system over the short, medium, and long term. Inclusion of a project in the TRIP does not guarantee that it will be funded, nor does inclusion indicate that a project will be eligible for any given funding source. However, these projects have been identified by the RPC and its partners as potentially enhancing the resilience of the transportation system. As such they are recommended for implementation when funding and capacity are available.

The project list includes the following information:

1. Project Name
2. Project Scope/Description
3. Parish
4. City (if applicable)
5. Facilities Benefited
6. Hazard(s) Potentially Addressed
7. State Project Number (SPN, if available)
8. Estimated Cost (if available)

Project Identification Process

The projects included in the TRIP were identified through a review of the RPC's existing program of projects and by soliciting project concepts from stakeholders.

As part of its broader transportation planning process, the RPC notes the potential contribution of each project in the MTP and TIP to one or more of the planning priorities defined in the current MTP: Safety & Security; Sustainability & Resilience; Equity; Economic

Opportunity; Reliability & Connectivity; and Stewardship & Preservation. To identify projects for inclusion in the TRIP, the RPC reviewed all projects that were noted as contributing to the Sustainability & Resilience planning priority. Those projects that specifically address one or more hazards identified in the TRIP or in other local plans were included.

The RPC also solicited project concepts from stakeholders, particularly those in local governments and other agencies that own transportation infrastructure. Project concepts were accepted throughout the TRIP development process, including two major announcements of the solicitation at stakeholder workshops held in March and November 2025. Stakeholders were also informed of the request for projects at numerous meetings throughout the period during which the TRIP was developed.

Projects identified in the MTP and TIP have previously been prioritized by the RPC and its partners for inclusion in those planning documents. Those projects submitted by local partners have been prioritized for inclusion in the TRIP using their own internal processes and are assumed to be those partners' highest priority transportation resilience projects. As such, the projects listed in the TRIP are considered to be the region's prioritized list of transportation resilience projects.

Investment Plan

The RPC hopes to align the projects, strategies, and vulnerabilities identified in the TRIP with current and future funding. Funding sources continue to change based on available federal, state, and local opportunities. It is anticipated that identifying specific strategies and projects in this plan will help increase their eligibility to receive funding. Federally funded sources will vary based on the nature of the project (e.g., nature-based solutions may qualify for different funding opportunities than emergency management or flood control measures) and the availability of grants. Due to the variety of strategy recommendations, projects may qualify for non-transportation funding through federal agencies depending on the project type. Under existing programs, it is likely that the two main categories of funding for transportation resilience projects will be PROTECT and Surface Transportation Block Grants (STBG).

While the TRIP is not fiscally constrained, the projects contained herein cannot receive federal transportation funds without advancing through the fiscally constrained planning process outlined in the RPC's long-range MTP and short-range TIP. Fiscal constraint requires that a project may only be included in the MTP if there is a reasonable assurance that funds will be available to construct the project by the year in which it is programmed. Further, projects may only be included in the TIP if funding has been identified and specifically allocated to that project. Projects included in the TIP are scheduled to be implemented within the next four fiscal years.

While some projects listed in the TRIP are already included in the MTP or TIP, others will require further investigation and the identification of potential funding before being added to those documents and advancing to implementation. That process will require close coordination between the RPC and its partners to select projects for advancement and further develop them until they are ready for inclusion in the MTP and TIP. Additionally, most federal funds, including PROTECT and STBG, require a local match. In most cases the match will be provided by the owner of the transportation asset to be improved, and projects may not advance through the MTP and TIP without a commitment by the sponsor agency to pay for the match.

Local and state funding could also fund resilience projects in the region or help identify further resilience needs by expanding on current planning efforts. Local advocacy and philanthropic groups like the Greater New Orleans Foundation provide funding for stormwater projects and planning. The CPRA, a state program that oversees the State's Coastal Master Plan and restoration plans and funds through both federal and state funds wetland and coastal restoration projects. Through a regular review of proposed transportation projects, RPC will also review what additional funding mechanisms could fund resilience projects and possible connections to additional projects. Existing proposed projects though programs such as LWI and CPRA could help prioritize and fund immediate transportation resilience needs.



6 Conclusion

Implementation

Though the TRIP is the culmination of significant efforts by the RPC, it is also the first step in what will become an ongoing resilience planning program. The TRIP provides tools and guidance that address immediate and long-term needs for improving the resilience of the region's transportation system.

In the short term, the RPC can begin to use the risk-based vulnerability assessment to inform its plans, studies, and decision-making processes. Data from the assessment, particularly the VAST, will be used in feasibility studies to identify specific locations and assets that may require additional evaluation. By expanding the scope of RPC's studies to consider vulnerabilities to natural hazards, these efforts can be the first step in developing solutions that will reduce risks to the transportation system. The RPC also plans to continually update the assessment, incorporating new data and stakeholder input to create an increasingly nuanced understanding of transportation vulnerabilities.

Regional resilience will also be directly improved over the long term through construction of the projects listed in the TRIP. Through coordination with local, state, and federal partners, the RPC will continue to advance projects through the planning process. Local parishes and municipalities serve the vital role of providing on-the-ground expertise regarding vulnerabilities and needed resilience strategies. At the state level, the RPC regularly works with DOTD to advance projects on both locally- and state-owned facilities, and ensuring the RPC and DOTD reach a consensus on which resilience strategies are appropriate and effective will be crucial to advancing them to implementation. In fact, this work has already begun as the RPC now includes resilience considerations in the Stage 0 feasibility studies required by DOTD for many projects. Additionally, coordination with federal agencies such as the Army Corps of Engineers, the agency overseeing much of the flood control measures in Southeast Louisiana can ensure that natural systems and infrastructure work together.

Implementation of the TRIP's strategy recommendations will occur in large part by incorporating resilience considerations into RPC's other ongoing work. The TRIP provides a toolkit of resilience enhancement strategies that the RPC can incorporate into all of its planning activities, thereby ensuring that protection of the transportation system from hazards is considered at varying scales, through multiple lenses, and in coordination with a variety of partners. By establishing programs and processes to implement the strategies recommended in the TRIP, the RPC will ensure that the region will be able to respond to hazardous impacts and be prepared for changing conditions over the long term. For example, the TRIP will inform the next iteration of the MTP, synthesizing the needs identified

into planning priorities that will guide the RPC moving forward.

The TRIP also supports other recent and upcoming efforts. In 2023, the RPC published the region's Priority Climate Action Plan with EPA funding through the Climate Pollution Reduction Grant. A follow up to that plan, the Comprehensive Climate Action Plan was completed in December 2025 and includes, in addition to emissions reduction measures, resilience and adaptation strategies. As part of the RPC's LWI work, a watershed plan that focuses on reducing flood risk will also be developed for the region by December 2026. The RPC plans to utilize LWI resources and funding to gather additional flood data to help improve future vulnerability assessments and prioritize future projects.

As RPC continues this work, updated data and strategies will help shape future resilience planning. Future resilience planning will also consider changing weather patterns and include updated data based on availability to better analyze future and on-going resilience needs. These analyses will also help inform RPC studies and plans and become part of the RPC planning process.

Finally, the RPC plans to update the TRIP at regular intervals to ensure that it accurately reflects current conditions in the region. In the interim, the vulnerability assessment will continue to be refined as new data and methods become available. The list of priority projects is also expected to change over time. After the plan is formally adopted, RPC staff may amend the TRIP to add, remove, or change information, including amendments to projects. It is also anticipated that as resilience planning programs are implemented, they will evolve as lessons are learned and best practices are identified. Through thoughtful implementation of this plan and continuously improving on its recommendations, the RPC can help protect the regional transportation system and the community it serves.



Appendix A: Federal Requirement Crosswalk

This appendix lists the required and optional elements of a Resilience Improvement Plan per the PROTECT program guidelines (23 USC 176(e)(1) and 23 USC 176(e)(2)) and where each element is addressed in this document.

The plan	Corresponding TRIP Section
Shall…	
...be for the **immediate and long-range planning activities and investments** of the State or metropolitan planning organization with respect to resilience of the surface transportation system within the boundaries of the State or metropolitan planning organization, as applicable;	Introduction: About this Plan; Implementation
...demonstrate a **systemic approach to surface transportation system resilience** and **be consistent with and complementary of the State and local mitigation plans required under** section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (**42 U.S.C. 5165**);	Baseline Conditions: Hazards Assessment
... include a **risk-based assessment of vulnerabilities of transportation assets and systems to current and future weather events and natural disasters**, such as severe storms, flooding, drought, levee and dam failures, wildfire, rockslides, mudslides, sea level rise, extreme weather, including extreme temperatures, and earthquakes;	Risk-Based Vulnerability Assessment
Shall, as appropriate…	
...include a **description of how the plan will improve the ability** of the State or metropolitan planning organization-	
to **respond promptly to the impacts of weather events and natural disasters**; and	Recommendations: Strategies
to be **prepared for changing conditions**, such as sea level rise and increased flood risk;	Recommendations: Strategies and Priority Projects; Implementation
...**describe the codes, standards, and regulatory framework, if any**, adopted and enforced to ensure resilience improvements within the impacted area of proposed projects included in the resilience improvement plan;	Baseline Conditions: Regional Resilience Planning; Recommendations: Strategies
...**consider the benefits of combining hard surface transportation assets, and natural infrastructure**, through coordinated efforts by the Federal Government and the States;	Recommendations: Strategies

The plan	Corresponding TRIP Section
...**assess the resilience of other community assets**, including buildings and housing, emergency management assets, and energy, water, and communication infrastructure;	Introduction: About this Plan; Recommendations: Strategies
...use a **long-term** planning period; and	Recommendations; Implementation
...include such **other information as** the State or metropolitan planning organization considers **appropriate.**	Baseline Conditions
May…	
...designate evacuation routes and strategies, including multimodal facilities, designated with consideration for individuals without access to personal vehicles;	Recommendations: Strategies
...plan for response to anticipated emergencies, including plans for the mobility of-	Recommendations: Strategies
emergency response personnel and equipment; and	Recommendations: Strategies
access to emergency services, including for vulnerable or disadvantaged populations;	Recommendations: Strategies
...describe the resilience improvement policies, including strategies, land-use and zoning changes, investments in natural infrastructure, or performance measures that will inform the transportation investment decisions of the State or metropolitan planning organization with the goal of increasing resilience;	Recommendations: Strategies
...include an investment plan that-	
includes a **list of priority projects;** and	Recommendations: Projects
describes how funds apportioned to the State under section 104(b)(8) or provided by a grant under the program would be invested and matched, which shall not be subject to fiscal constraint requirements; and	Recommendations: Investment Plan
...use science and data and indicate the source of data and methodologies;	Risk-Based Vulnerability Assessment; Methodology

Appendix B: VAST Methodology

VAST 2025 Methodology

Asset Data Points

VAST road and bridge data points were created for Federal-Aid roads and bridges on the draft Federal-Aid network provided to the RPC by the Louisiana Department of Transportation and Development (DOTD) on August 28, 2023. This roadway network was chosen because it contains substantial updates from the prior version of the Federal-Aid Network, and RPC determined that it is significantly similar to the presumed final version of the network that will be produced at a later date following approval by the Federal Highway Administration (FHWA).

To create points, RPC used GIS software to generate points along the roadway lines every 350 feet. The distance was chosen because it is the approximate length of a city block or in the urban core of the City of New Orleans, which features the densest development and street network in the region. Using this length therefore resulted in at least one point being assigned to every block in most parts of the region. The RPC assessed vulnerability at 49,842 unique roadway points.

Most bridges in the region were similarly evaluated using points assigned every 350 feet along the bridge deck; however, due to data limitations some bridge decks could not be evaluated. Up-to-date elevation data was not available for some bridges in St. Tammany and Tangipahoa Parishes. In these instances, the RPC assigned a point at each bridge approach, and these were used for assessment purposes. Bridges that carry both directions of a roadway on a single span were assigned a single point at each end, while bridges that carry each direction of a roadway on separate spans were assigned points at both ends of both spans. Assessments were conducted on 4,149 unique bridge deck points and 650 unique bridge approach points.

VAST data points were then assigned characteristics based on their location, features, and other available data. These characteristics, referred to as vulnerability indicators, were then combined in VAST to calculate vulnerability scores for each point, for each of the hazards assessed.

Indicator Calculation Methods and Citations

Listed alphabetically.

Bridge Approach Elevation

Indicator Type

- Bridge Approach Sensitivity to Precipitation
- Bridge Approach Sensitivity to Sea Level Rise
- Bridge Approach Sensitivity to Storm Surge

Description

The height in feet of a bridge approach above sea level. A bridge approach is defined as the point at which a bridge meets the ground-level roadway, both at the entry and exit of the bridge.

Rationale for Inclusion

Floodwater is more likely to accumulate at lower elevations; it is therefore assumed that transportation assets at lower elevations are more vulnerable to all types of flooding than assets at a higher elevation.

Methodology

RPC used GIS software to assign elevations to VAST points. Bridge approach elevation data was derived from Digital Elevation Models (DEMs) based on light detection and ranging (Lidar) data. See citations below.

VAST Scoring

Scoring followed the inverse of the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	**VAST Score**
1st (lowest values)	4
2nd	3
3rd	2
4th (highest values)	1

Citation

To assign elevations to VAST bridge approach points RPC used a combination of LIDAR collections (see Figure 8):

1. USGS LA 2021 GNO 1 C22: half-meter resolultion, collected 2021, published 2023
2. USGS LA Coastal Louisiana 1 2020: half-meter resolution, collected 2021, published 2023
3. USGS LA Coastal Louisiana 2 2020: half-meter resolultion, collected 2021, published 2023

4. USGS LA Upper Delta Plain 2017: one-meter resolution, collected and published 2017
5. USGS LA Statewide 2002: three-meter resolution, collected 2000, published 2002

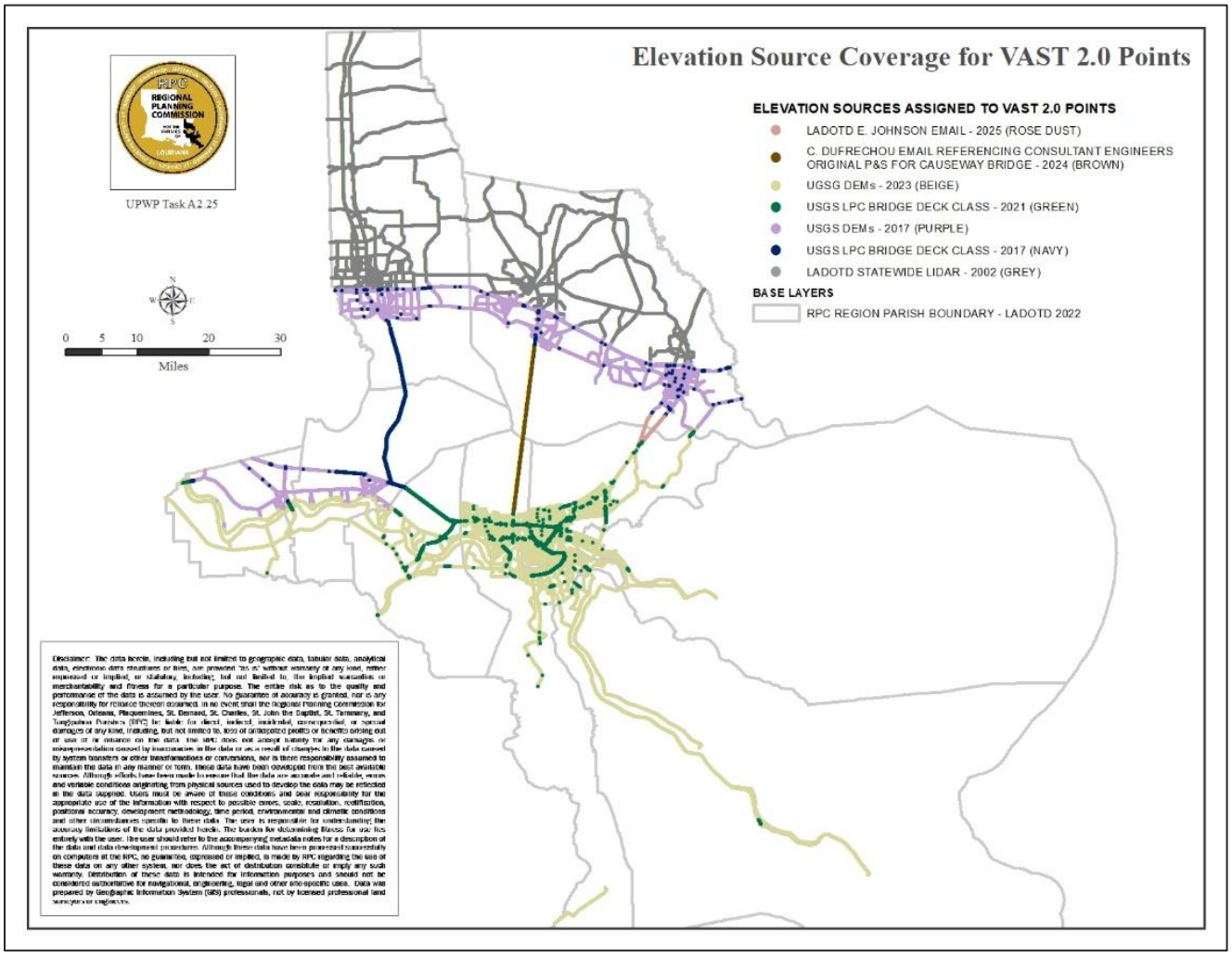


Figure 8: Elevation Source Coverage for VAST points

Bridge Deck Elevation

Indicator Type

- Bridge Deck Sensitivity to Precipitation
- Bridge Deck Sensitivity to Sea Level Rise
- Bridge Deck Sensitivity to Storm Surge

Description

The height in feet of a bridge deck above sea level.

Rationale for Inclusion

Floodwater is more likely to accumulate at lower elevations; it is therefore assumed that transportation assets at lower elevations are more vulnerable to all types of flooding than assets at a higher elevation.

Methodology

RPC used GIS software to assign elevations to VAST points. In most cases, bridge deck elevation data was derived from Digital Elevation Models (DEMs) based on light detection and ranging (Lidar) data. Elevations for the Lake Pontchartrain Causeway, US 11 and I-10 Lake Pontchartrain bridges were obtained from the Greater New Orleans Expressway Commission (GNOEC) and DOTD. See citations below.

VAST Scoring

Scoring followed the inverse of the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	VAST Score
1st (lowest values)	4
2nd	3
3rd	2
4th (highest values)	1

Citation

To assign bridge deck elevations to VAST points RPC used a combination of LIDAR collections and data provided by stakeholders (see Figure 8):

1. USGS LA 2021 GNO 1 C22: half-meter resolultion, collected 2021, published 2023
2. USGS LA Coastal Louisiana 1 2020: half-meter resolution, collected 2021, published 2023
3. USGS LA Coastal Louisiana 2 2020: half-meter resolultion, collected 2021, published 2023
4. USGS LA Upper Delta Plain 2017: one-meter resolution, collected and published 2017
5. USGS LA Statewide 2002: three-meter resolution, collected 2000, published 2002
6. LADOTD (2025). Ennis Johnson Email.
7. GNOEC (2025). Carlton Dufrechou Email.

Congestion Management Network

Indicator Type

- Road Sensitivity to Temperature
- Bridge Sensitivity to Temperature

Description

The Congestion Management Network (CMN) was created to aid analyses for the RPC's ongoing Congestion Management Process (CMP), and is a subset of federal-aid roadways that have been identified as having the highest traffic volumes, most severe roadway congestion, and/or greatest significance to the region.

Rationale for Inclusion

Extreme temperatures can adversely affect road and bridge pavements. Higher traffic volumes and/or congestion can exacerbate this effect as vehicles cause pavement deterioration. CMN routes carry a higher number of vehicles for a greater length of time than other roadways, and therefore may be more likely to be affected by extreme temperatures.

Methodology

The CMN is maintained by the RPC and reviewed at least every four years. VAST points were designated as being either on or off the CMN in GIS software by selecting points in the VAST point feature class that intersected with the CMN line feature class.

VAST Scoring

CMN	VAST Score
On CMN	4
Off CMN	1

Citation

Regional Planning Commission (2025). *Congestion Management Network*.

Road Bed Elevation

Indicator Type

- Road Sensitivity to Sea Level Rise
- Road Sensitivity to Storm Surge

Description

The height in feet of a road bed above sea level.

Rationale for Inclusion

Floodwater is more likely to accumulate at lower elevations; it is therefore assumed that transportation assets at lower elevations are more vulnerable to all types of flooding than assets at a higher elevation.

Methodology

RPC used GIS software to assign elevations to VAST points. Bridge approach elevation data was derived from Digital Elevation Models (DEMs) based on light detection and ranging (Lidar) data. See citations below.

VAST Scoring

Scoring followed the inverse of the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	VAST Score
1st (lowest values)	4
2nd	3
3rd	2
4th (highest values)	1

Citation

To assign elevations to VAST points RPC used a combination of LIDAR collections (see Figure 8):

1. USGS LA 2021 GNO 1 C22: half-meter resolultion, collected 2021, published 2023
2. USGS LA Coastal Louisiana 1 2020: half-meter resolution, collected 2021, published 2023
3. USGS LA Coastal Louisiana 2 2020: half-meter resolultion, collected 2021, published 2023
4. USGS LA Upper Delta Plain 2017: one-meter resolution, collected and published 2017
5. USGS LA Statewide 2002: three-meter resolution, collected 2000, published 2002

Evacuation Route

Indicator Type

- Adaptive Capacity: All Hazards, All Asset Types

Description

Evacuation routes are designated roadways used to travel from an at-risk location to a safer location. Routes are designated by both state and local governments, each with their own criteria for determining what is an appropriate route.

Rationale for Inclusion

Evacuation routes are critical assets in advance of and during a hazardous event. If they are damaged or destroyed, community members may be at greater risk because they cannot use the route to travel to a safe location.

Methodology

The presence of evacuation routes was assigned to VAST data points using GIS software. The evacuation routes were determined through previous research by RPC, compiling state and locally designated routes across the region.

VAST Scoring

Evacuation Route	VAST Score
On Evacuation Route	4
Off Evacuation Route	1

Citation

RPC (2024). Evacuation Route data layer compiled from various state and local agencies.

FEMA Flood Zone

Indicator Type

- Bridge Exposure to Precipitation
- Road Exposure to Precipitation

Description

As stated by FEMA:[26]

> A flood zone is a defined geographic area with a specific flood hazard risk. It represents the probability and impact of flooding on that area and is used to determine insurance requirements and costs. Flood zones are shown collectively on a flood map.

Rationale for Inclusion

Though flood zones are primarily used to determine flood insurance rates for structures, they are a valuable indicator of a geographic area's likelihood of flooding. It is assumed

[26] FEMA (2025). What are Flood Zones and Maps? https://www.floodsmart.gov/flood-zones-and-maps/what-is-my-flood-zone#:~:text=A%20flood%20zone%20is%20a,collectively%20on%20a%20flood%20map.

that if structures in a geographic area have a given flood risk, adjacent transportation assets will have a similar risk level.

Methodology

Flood zones were assigned to VAST data points using GIS software. To identify flood zones, RPC used the flood zone map currently in use by each parish and/or subarea at the time of the analysis (see citation).

VAST Scoring

Scores were assigned based on flood zone designations and their corresponding estimated flood risks:

Flood Zone	VAST Score
Zone X: Reduced Risk	1
Zone B: 0.2% Annual Chance Flood Hazard	2
Zone A: 1% Annual Chance Flood Hazard	3
Zone V: High Risk Coastal Flood Hazard	4

Citation

Flood zones were derived from multiple sources:

1. St. Charles Parish: FEMA (1992). Flood Insurance Rate Map.
2. St. Tammany Parish, except Federal Lands of the Big Branch National Wildlife Refuge: FEMA (2008). Flood Insurance Rate Map.
3. All Other Areas: FEMA (2024). Flood Insurance Rate Map.

FHWA Functional Class

Indicator Type

- Adaptive Capacity: All Hazards, All Asset Types

Description

FHWA Functional Classifications are a systematic method for defining the role of a given roadway based on the users, origins, and destinations it serves. The classifications, defined below, are typically assigned codes ranging from 1 to 7. In general, lower classification numbers indicate that a roadway carries more roadway users, a greater variety of user types, and serves a greater number of origins and destinations.

1. Interstate
2. Other Freeways and Expressways
3. Other Principal Arterial

4. Minor Arterial
5. Major Collector
6. Minor Collector
7. Local

Rationale for Inclusion

Functional Classifications are a general indicator of how important a roadway is to the community. While all roads serve some necessary purpose, those with lower classification numbers are likely more necessary to the functioning of the region's transportation system.

Methodology

Functional Classifications were assigned to data points using GIS software. Classifications were derived from data provided by DOTD (see citation).

VAST Scoring

Lower classification numbers received higher VAST scores:

Functional Class	VAST Score
1	4
2	4
3	3
4	2
5	2
6	1
7	1

Citation

DOTD (2023). Draft Federal-Aid Network geospatial layer.

Flood Protection

Indicator Type

- Bridge Sensitivity to Sea Level Rise
- Road Sensitivity to Sea Level Rise
- Bridge Sensitivity to Storm Surge
- Road Sensitivity to Storm Surge

Description

Flood protection systems are intended to reduce the impacts of major flooding events within an area. Systems in the region can range from simple berms and levees to large-scale floodgates.

Rationale for Inclusion

Roads and bridges located within areas protected by flood protection systems are assumed to be less likely to be severely impacted by flooding, particularly floods caused by storm surge and sea level rise.

Methodology

The US Army Corps of Engineers (USACE) provides geospatial data describing the areas within flood protection systems, including the type of system. GIS software was used to select points within flood protection systems and assign the type of system to each point.

Flood protection system types considered in the VAST include:

- Accredited Levee System: A system that FEMA has determined to meet the design, data, and documentation requirements of 44 CFR 65.10, federal regulations that determine the mapping of areas protected by levee systems.[27]
- Provisionally Accredited Levee (PAL) System: A levee that FEMA previously accredited on an effective FIRM, and is now awaiting certified data and/or documentation to show the levee remains compliant with National Flood Insurance Program (NFIP) regulations.[28]
- A99: An area is sufficiently protected by a levee system from a 1% annual flood event, but construction of the levee is not yet complete
- Non-Accredited Levee System: A levee exists, but it has not completed or will not complete the FEMA accreditation process.

VAST Scoring

Flood Protection System Type	VAST Score
Accredited Levee System	1
Provisionally Accredited Levee (PAL) System	2
A99	2
Non-Accredited Levee System	3
None	4

[27] USACE (2012). Levee Certification vs. Accreditation. https://www.mvk.usace.army.mil/Portals/58/docs/LSAC/LeveeCertification.pdf

[28] Ibid.

Citation

USACE (2024). National Levee Database. https://levees.sec.usace.army.mil/data-services/services/

High Temperature Frequency

Indicator Type

- Bridge Exposure to Extreme Heat
- Road Exposure to Extreme Heat

Description

The high temperature frequency indicator is based on climate projection models that estimate the percentage of days with temperatures above the 90th percentile for the region in 2056. The data was initially developed by the World Climate Research Programme (WCRP) for the Coupled Model Intercomparison Project (CMIP), version six. CMIP is an international climate modelling project that combines modelling data from across the world, and which provides climate projections for a variety of scenarios and indicators.[29] Researchers at the Scripps Institution of Oceanography at the University of California, San Diego then downscaled the CMIP data, which is produced at a global scale, to a six kilometer grid for use at the local level using a process known as Localized Constructed Analogs, version 2 (LOCA2).[30] The LOCA2 data provides climate projections at a local level that can be used for a variety of purposes.

Rationale for Inclusion

LOCA2 data provides an estimate of potential extreme heat events in the future. While past temperature trends are a direct measure rather than an estimate, the VAST analysis and the TRIP are intended to help the region plan for the future. As such, a projection was preferred over historical trends.

Methodology

RPC converted the LOCA2 data to a raster using GIS software, then assigned the data from the raster to the VAST data points.

[29] WCRP (2025). CMIP Overview. https://wcrp-cmip.org/cmip-overview/
[30] Pierce, D.W. (2025). What is LOCA? https://loca.ucsd.edu/what-is-loca/

The LOCA2 data includes historic trends beginning in 1950 and future projections to 2100. The RPC selected the data year of 2056 because this is the horizon year for the next iteration of its Metropolitan Transportation Plan.

LOCA2 data also includes projections for multiple climate scenarios, referred to as Shared Socioeconomic Pathways (SSPs). SSPs are a standard set of assumptions about socioeconomic and technological changes that may occur in the future, each with its own associated levels of GHG emissions. For this analysis, the RPC used SSP 245 as the "low" extreme heat scenario and SSP 585 as the "high" extreme heat scenario. SSP 245 is used by climate researchers to represent a medium pathway of GHG emissions, and SSP585 represents the upper boundary of emissions scenarios.[31]

VAST Scoring

Scoring followed the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	VAST Score
1st (lowest values)	1
2nd	2
3rd	3
4th (highest values)	4

Citation

Pierce, D.W. (2023). LOCA Version 2 for North America. https://loca.ucsd.edu/loca-version-2-for-north-america-ca-jan-2023/

Presence of Transit Routes

Indicator Type

- Bridge Sensitivity to Extreme Heat
- Road Sensitivity to Extreme Heat

Description

This indicator shows whether a road or bridge carries either a fixed-route bus or streetcar transit line. For streetcars, only lines that operate directly in the street were considered.

[31] DKRZ (2025). The SSP Scenarios. https://www.dkrz.de/en/communication/climate-simulations/cmip6-en/the-ssp-scenarios

Routes that carry a streetcar in the neutral ground were not noted as carrying public transit unless they also carry bus lines on the roadway itself.

Rationale for Inclusion

Extreme temperatures can adversely affect road and bridge pavements. High-weight vehicles and high traffic volumes can exacerbate this effect as vehicles cause pavement deterioration. Transit vehicles are typically high weight and operate on the same roadways for extended periods. Transit routes therefore may be more likely to be affected by the effects of extreme temperatures.

Methodology

RPC obtained transit route data from all transit operators in the region with fixed-route service. VAST points were designated as being either on or off transit routes in GIS software by selecting points in the VAST point feature class that intersected with the transit route feature class.

VAST Scoring

Transit Presence	VAST Score
On Transit Route	4
Off Transit Route	1

Citation

RPC (2025). Regional transit routes obtained from local transit operators and compiled into a single geospatial feature class.

Presence of Overhead Utility Lines

Indicator Type

- Bridge Sensitivity to Wind
- Road Sensitivity to Wind

Description

This indicator attempts to identify assets that may be at risk of having an electric transmission line and/or supporting structure fall onto the asset during high wind events.

Rationale for Inclusion

Fallen electrical lines and/or supporting structures can not only block roads and bridges but may also create dangerous conditions if fallen lines are still live.

Methodology

RPC assumed that if a transmission line or its supporting structure (e.g., pole) falls, in most instances the potential radius of the fall zone would be no larger than the height of the support structure. Therefore, it was assumed that points within a distance of a support structure that is less than or equal to that structure's height are at an increased risk of being impacted if the structure or associated transmission lines are damaged by wind. To identify points within the potential fall zone of transmission lines, RPC first identified the location of electric transmission lines using publicly available data provided by the US Department of Homeland Security (USDHS) via the Homeland Infrastructure Foundation Level Database (HIFLD). Then, RPC calculated the height of the supporting structure in GIS software using Lidar elevation data and created a buffer around each structure with a radius equal to the structure's height. Points within the buffer were noted as having overhead utility lines present.

VAST Scoring

Overhead Utility Lines	**VAST Score**
Overhead Utility Lines Present	4
Overhead Utility Lines Not Present	1

Citation

Transmission Line Locations: USDHS (2022). HIFLD: Electric Power Transmission Lines.

Lidar / Elevation:

1. USGS LA 2021 GNO 1 C22: half-meter resolultion, collected 2021, published 2023
2. USGS LA Coastal Louisiana 1 2020: half-meter resolution, collected 2021, published 2023
3. USGS LA Coastal Louisiana 2 2020: half-meter resolultion, collected 2021, published 2023
4. USGS LA Upper Delta Plain 2017: one-meter resolution, collected and published 2017

Propensity for Ponding

Indicator Type

- Road Sensitivity to Precipitation

Description

In context of this analysis, ponding refers to the accumulation of stormwater in a single location. Propensity for ponding indicates that a point on a roadway may be likely to experience more floodwater accumulation than other nearby points.

Rationale for Inclusion

Roadway points that have a propensity for ponding may be more likely to flood.

Methodology

Propensity for ponding was determined by comparing the elevation of road points to the elevation of adjacent points. It was assumed that floodwater flows from higher elevations to lower elevations. Therefore, a point is considered to have a propensity for ponding if it is at a lower elevation than the points immediately before and after it on a route. Points at the beginning or end of a route were compared to the points immediately after or before it, respectively. More information on roadway elevation can be found in the Road Bed Elevation section above.

To determine elevations of points along a route, points were assigned sequential, unique identification numbers from the beginning of a route to the end. The identification numbers were then sorted sequentially in a spreadsheet, allowing points' geographic placement on a route to be displayed in a list. Each point's elevation was then compared to the point immediately before and after it (i.e., above or below it on the list). Points with a lower elevation than those before and after it were noted as having a propensity for ponding. Points with a higher elevation than at least one adjacent point were noted as not having a propensity for ponding. A limited number of road segments, especially freeway ramps, were not long enough to feature more than one point (note that road points were assigned every 350'). In these instances, propensity for ponding was not assigned and this indicator was not used in calculating those points' VAST scores.

VAST Scoring

CMN	**VAST Score**
Propensity for Ponding	4
No Propensity for Ponding	1
NA*	No Data

*NA: Propensity for ponding could not be assessed; indicator not used in analysis.

Citation

RPC (2025). Roadway Propensity for Ponding.

Proximity to Coastline

Indicator Type

- Bridge Exposure to Sea Level Rise
- Road Exposure to Sea Level Rise
- Bridge Exposure to Storm Surge
- Road Exposure to Storm Surge
- Bridge Exposure to Wind
- Road Exposure to Wind

Description

Proximity to coastline indicates a point's distance in feet to the nearest coastal water body, which includes the following:

- Bayou Perot
- Bayou Rigolettes
- Gulf of America and Gulf Tidal Marshes
- Lac Des Allemands
- Lake Borgne
- Lake Cataouatche
- Lake Maurepas
- Lake Pontchartrain
- Lake Salvador
- Lake St. Catherine
- Little Lake
- The Rigolets
- Turtle Bay

Rationale for Inclusion

Flooding caused by sea level rise and storm surge is a direct result of water encroaching on land from coastal water bodies. It is therefore assumed that assets closer to such water bodies are more likely to be inundated by storm surge and sea level rise.

Similarly, coastal locations are more likely to be impacted by winds from storms travelling from coastal waters onto land, particularly tropical cyclones. Tropical cyclone wind speeds tend to decrease as a storm travels inland. As such, it is assumed that locations near the coast are more likely to be impacted by winds from tropical cyclones and other coastal storms.

Methodology

RPC used GIS software to measure the distance in feet between asset data points and the shore of the nearest coastal water body. Water body location data was obtained from the Louisiana Division of Administration's Office of State Lands (OSL).

VAST Scoring

Scoring followed the inverse of the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	VAST Score
1st (lowest values)	4
2nd	3
3rd	2
4th (highest values)	1

Citation

Louisiana Division of Administration OSL (2022). State Water Bottoms. https://www.doa.la.gov/doa/osl/gis-data/

Proximity to Repetitive Loss Properties

Indicator Type

- Road Sensitivity to Precipitation

Description

A Repetitive Loss Property is defined by FEMA as an NFIP-insured structure that has had at least two paid flood losses of more than $1,000 in any ten year period since 1978.[32] In the VAST, the RPC used the number of repetitive loss properties per square mile within a Census block group as an indicator of road sensitivity to precipitation.

Rationale for Inclusion

Repetitive loss properties provide a valuable record of historic flooding in an area. It is assumed that the higher the number of repetitive loss properties in an area, the more frequently that area has experienced flooding. It is also assumed that if structures in an area have flooded, adjacent transportation assets have also likely experienced flooding.

Methodology

RPC obtained historic repetitive loss data from FEMA, then calculated the number of repetitive loss properties per square mile for each block group in the nine-parish region.

[32] FEMA & NFIP (2025). Glossary. https://www.floodsmart.gov/definitions

Square mileage calculations were based on land area and did not include water. The repetitive loss per square mile values were then assigned to VAST data points.

VAST Scoring

Scoring followed the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	VAST Score
1st (lowest values)	1
2nd	2
3rd	3
4th (highest values)	4

Citation

Repetitive Losses: FEMA (2025). Repetitive Loss Counts (Block Group). https://fema.maps.arcgis.com/home/item.html?id=e7fcac89beae4841be9df37926309da8

Block Group Area (Square Miles): RPC (2025). Area in square miles calculated by RPC using GIS software, based on US Census Bureau TIGER 2024 Block Group geography.

Scour Rating

Indicator Type

- Bridge Sensitivity to Precipitation

Description

Bridge scouring is the degree to which soil and sediment surrounding the foundational structures of a bridge have been eroded by water. The National Bridge Inventory (NBI) provides a scour rating for most bridges on the Federal-Aid Network.

Rationale for Inclusion

Bridges may be at risk of structural damage if the soil surrounding their foundations exhibit severe scouring. Scouring can be exacerbated by fast-moving water, which often results from extreme precipitation events as surrounding land drains into waterways.

Methodology

NBI Item 113 includes scour ratings for most Federal-Aid Bridges. These ratings were assigned to each VAST bridge data point. The scour rating definitions are:[33]

Scour Rating Code	Description
N	Bridge not over waterway.
U	Bridge with "unknown" foundation that has not been evaluated for scour. Until risk can be determined, a plan of action should be developed and implemented to reduce the risk to users from abridge failure during and immediately after a flood event.
T	Bridge over "tidal" waters that has not been evaluated for scour, but considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections until an evaluation is performed ("Unknown" foundations in "tidal" waters should be coded U.)
9	Bridge foundations (including piles) on dry land well above flood water elevations.
8	Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above top of footing by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), by calculation or by installation of properly designed countermeasures.
7	Countermeasures have been installed to mitigate an existing problem with scour and to reduce the risk of bridge failure during a flood event. Instructions contained in a plan of action have been implemented to reduce the risk to users from a bridge failure during or immediately after a flood event.
6	Scour calculation/evaluation has not been made. (Use only to describe case where bridge has not yet been evaluated for scour potential.)
5	Bridge foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be within the limits of footing or piles by assessment (i.e., bridge foundations are on rock formations that have been determined to resist scour within the service life of the bridge), by calculations or by installation of properly designed countermeasures.
4	Bridge foundations determined to be stable for assessed or calculated scour conditions; field review indicates action is required to protect exposed foundations.

[33] FHWA (2025) NBI Data Dictionary, Item 113. https://nationalbridges.com/nbiDesc.html#ITEM_113

Scour Rating Code	Description
3	Bridge is scour critical; bridge foundations determined to be unstable for assessed or calculated scour conditions: Scour within limits of footing or piles; Scour below spread-footing base or pile tips.
2	Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations, which are determined to be unstable by: a comparison of calculated scour and observed scour during the bridge inspection, or; an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60 (Substructure Condition Ratings).
1	Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic. Failure is imminent based on: a comparison of calculated and observed scour during the bridge inspection; or an engineering evaluation of the observed scour condition reported by the bridge inspector in Item 60 (Substructure Condition Ratings).
0	Bridge is scour critical. Bridge has failed and is closed to traffic.
99	Miscoded data

VAST Scoring

VAST Scores for NBI Item 113 (Scour Rating) were as follows:

Scour Rating	VAST Score
5	1
8	1
9	1
N	1
6	2
7	2
T	2
U	2
4	3
0	4
1	4
2	4
3	4

Citation

FHWA (2024). National Bridge Inventory for Louisiana.
https://www.fhwa.dot.gov/bridge/nbi/ascii2024.cfm

Sea Level Rise Inundation

Indicator Type

- Bridge Exposure to Sea Level Rise
- Road Exposure to Sea Level Rise

Description

Sea Level Rise inundation is the projected depth in feet of water above land that may occur under a given level of Sea Level Rise. NOAA produces estimates of potential Sea Level Rise inundation that take into account multiple factors, including the presence of coastal flood protection systems.

Rationale for Inclusion

Projected Sea Level Rise inundation indicates the potential flood depths caused by Sea Level Rise.

Methodology

To assess high and low Sea Level Rise scenarios, RPC obtained projected inundation caused by two- and three-foot Sea Level Rise from NOAA. The inundation depths were then compared to the elevations of VAST data points. Points with elevations lower than the projected inundation depth were noted as having the potential for Sea Level Rise Inundation.

VAST Scoring

Sea Level Rise Inundation	VAST Score
Likely Potential Inundation	4
Unlikely Potential Inundation	1

Citation

Sea Level Rise Forecast: NOAA (2022). Sea Level Rise Viewer.
https://coast.noaa.gov/slrdata/

Asset Elevations:

1. USGS LA 2021 GNO 1 C22: half-meter resolultion, collected 2021, published 2023

2. USGS LA Coastal Louisiana 1 2020: half-meter resolution, collected 2021, published 2023
3. USGS LA Coastal Louisiana 2 2020: half-meter resolultion, collected 2021, published 2023
4. USGS LA Upper Delta Plain 2017: one-meter resolution, collected and published 2017
5. USGS LA Statewide 2002: three-meter resolution, collected 2000, published 2002

Strong Wind Annualized Frequency

Indicator Type

- Bridge Exposure to Wind
- Road Exposure to Wind

Description

Strong Wind Annualized Frequency is a measure produced by FEMA as part of its National Risk Index (NRI). The index describes the annual frequency that a location has experienced sustained winds exceeding 58 miles per hour, often originating from thunderstorms.

Rationale for Inclusion

Strong Wind Annualized Frequency indicates the degree to which a transportation asset may be exposed to damaging wind events.

Methodology

RPC obtained Strong Wind Annualized Frequency from FEMA for each US Census Tract in the nine-parish region, and assigned these values to each VAST data point using GIS software.

VAST Scoring

Scoring followed the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	**VAST Score**
1st (lowest values)	1
2nd	2
3rd	3
4th (highest values)	4

Citation

FEMA NRI (2023). National Risk Index Annualized Frequency Strong Wind. https://www.arcgis.com/home/item.html?id=777b28b6ca9249d2a6eb7ec338a93ac2

Surge Inundation

Indicator Type

- Bridge Exposure to Storm Surge
- Road Exposure to Storm Surge

Description

Sea Level Rise inundation is the projected depth of water in feet above land that may occur under a given level of Storm Surge. NOAA produces estimates of potential Storm Surge inundation that take into account multiple factors, including the presence of coastal flood protection systems.

Rationale for Inclusion

Projected Storm Surge inundation indicates the potential flood depths caused by Storm Surge.

Methodology

To assess high and low Sea Level Rise scenarios, RPC obtained projected inundation caused by Category 3 and Category 5 hurricanes. These values were then assigned to VAST data points using GIS software.

VAST Scoring

Scoring followed the VAST default scoring method. Values were divided into quartiles, with scores assigned as follows:

Quartile	**VAST Score**
1st (lowest values)	1
2nd	2
3rd	3
4th (highest values)	4

Citation

NOAA (2022). National Storm Surge Risk Maps Version 3. https://www.nhc.noaa.gov/nationalsurge/#data

The first version of the SLOSH storm surge hazard maps, released in November 2014, was published in the American Meteorological Society (AMS) Journal of Weather, Climate and

Society, titled "A National View of Storm Surge Risk and Inundation". The publication is available online at http://journals.ametsoc.org/doi/abs/10.1175/WCAS-D-14-00049.1 and the preferred citation for the data and map service is as follows:

Zachry, B. C., W. J. Booth, J. R. Rhome, and T. M. Sharon, 2015: A National View of Storm Surge Risk and Inundation. *Weather, Climate, and Society*, **7**(2), 109–117. DOI: http://dx.doi.org/10.1175/WCAS–D–14–00049.1

Tree Canopy

Indicator Type

- Bridge Sensitivity to Wind
- Road Sensitivity to Wind

Description

This indicator attempts to identify assets that may be at risk of having trees fall onto the asset during high wind events.

Rationale for Inclusion

Fallen trees and/or tree branches can not only block roads and bridges but may also create dangerous conditions if people are present under the canopy.

Methodology

The RPC acquired one-meter resolution land cover of canopy raster datasets from NOAA. Using GIS software, VAST data points were noted as either having a tree canopy present or not present.

VAST Scoring

Canopy	VAST Score
Tree Canopy Present	4
Tree Canopy Not Present	1

Citation

NOAA (2024). 2020-2020 C-CAP Version 2 Canopy Cover. https://www.fisheries.noaa.gov/inport/item/70562

Additional Notes

The VAST analysis used for the risk-based vulnerability assessment does not include points on bridges over Lake Pontchartrain, including the Lake Pontchartrain Causeway, I-

10 Twin Span, US 11, and US 90. During VAST testing it was noted that these bridges scored as highly vulnerable due to their presence in a coastal floodplain, high exposure to storm surge, and other factors. Since VAST scores points in relation to one another, these high scores skewed the scores for other bridges within the same parish, resulting in low scores for nearly all bridges that do not cross Lake Pontchartrain. It is possible to assess these bridges on their own, but the scores will likely be identical across the entire bridge due to consistent characteristics along the majority of each bridge span.

Appendix C: Priority Project List

The projects listed below have been identified by the RPC and its partners as having the potential to improve the resilience of the regional transportation system. Inclusion of a project in the TRIP does not guarantee funding availability, nor does it indicate that the project is eligible for any given funding source.

The project list includes the following information:

1. Project Name
2. Project Scope/Description
3. Parish
4. City (if applicable)
5. Facilities Benefited
6. Hazard(s) Potentially Addressed
7. State Project Number (SPN, if available)
8. Estimated Cost (if available)

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
CAUSEWAY-EARHART INTERCHANGE	CONSTRUCTION OF RAMPS CONNECTING CAUSEWAY BLVD & EARHART EXPRESSWAY	JEFFERSON		ALL (EVACUATION)		
CONSTRUCT AND UTILIZE NATURAL FLOOD RETENTION SPACES TO PREVENT RUNOFF	UTILIZNG GREEN INFRASTRUCTURE TO DIVERT FLOODWATERS WILL REDUCE THE IMPACT OF NEW CONSTRUCTION ON THE COMMUNITY WHILE REDUCING THE RISK OF DAMAGE FROM FLOODING AS A RESULT OF HEAVY RAIN EVENTS.	JEFFERSON		FLOODING, SUBSIDENCE		
DEVELOP AND INCORPORATE MULTI-HAZARD MODELING INTO PLANNING EFFORTS	FUTURE CONDITIONS MAPPING IDENTIFIES AREAS OF FUTURE RISK THAT MAY NOT BE SUITABLE FOR DEVELOPMENT AND REDUCE FUTURE LOSSES.	JEFFERSON		FLOODING		
DRAINAGE IMPROVEMENTS	IMPLEMENT DRAINAGE IMPROVEMENT PROJECTS IN FLOOD-PRONE AREAS TO REDUCE FLOOD DAMAGE AND FLOOD CLAIMS	JEFFERSON		FLOODING		
DRAINAGE PUMPS	INSTALL INCREASED PERMANENT PUMPS TO ALLEVIATE FLOODING	JEFFERSON		FLOODING		
ELEVATE EQUIPMENT THAT IS VULNERABLE TO FLOOD DAMAGE	ELEVATING EQUIPMENT THAT ALLOWS CRITICAL FACILITIES AND BUSINESSES TO CONTINUE TO FUNCTION DURING EMERGENCIES SAVES LOSS OF REVENUE AND INVENTORY.	JEFFERSON		FLOODING		
GRAND ISLE PUMP STATIONS	INSTALLING PUMP STATIONS TO PROTECT ROADWAYS FROM FLOODING	JEFFERSON	GRAND ISLE	FLOODING		
GRAND ISLE STORM SURGE PROTECTION	ADDITIONAL STORM SURGE PROTECTION TO REDUCE IMPACT ON INFRASTRUCTURE	JEFFERSON	GRAND ISLE	FLOODING		

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
GRAND ISLE WATERLINE REPLACEMENT	CONSTRUCTION OF NEW WATERLINE CONNECTING GRAND ISLE TO LAFITTE	JEFFERSON		HURRICANE AND TROPICAL STORMS, FLOODING		$ 75,000,000.00
HARVEY BLVD. EXTENSION, PETERS RD TO MANHATTAN BLVD.	PROVIDES A NEW CONNECTION BETWEEN PETERS RD & MANHATTAN BLVD. IMPROVING CONNECTIVITY TO HURRICANE EVACUATION ROUTES	JEFFERSON		ALL (EVACUATION)	H.007208	$ 10,200,000.00
I-10 WIDENING - WILLIAMS TO VETERANS	WIDENING OF THE I-10 WILL IMPROVE DESIGNATED EVACUATION ROUTE	JEFFERSON		ALL (EVACUATION)	H.003074	
IDENTIFY AREAS MOST SUSCEPTIBLE TO SUBSIDENCE	SHIFTING URBAN GROWTH TO MORE STABLE LAND AREAS WILL MINIMIZE FUTURE INFRASTRUCTURE DAMAGE AND NEED FOR STRUCTURAL REPAIRS AND/OR RELOCATION OF FACILITIES.	JEFFERSON		SUBSIDENCE		
JEFFERSON PROGRAMMATIC TREE PLANTING AND VEGETATIVE MANAGEMENT	INCREASING VEGETATION IN URBAN AREAS HELPS TO DECREASE RAINWATER RUNOFF AND INCREASES THE AMOUNT OF SHADE SPACE THAT CAN PROTECT FROM HEAT INJURY.	JEFFERSON		FLOODING, EXTREME HEAT		
L&A RD. REALIGNMENT, KCS UNDERPASS TO EARHART EXPRESSWAY ON-RAMP	RE-ROUTING THE ROADWAY AROUND KANSAS CITY SOUTHER RR PROPERTY TO MAINTAIN & IMPROVE ACCESS TO EARHART EXPRESSWAY.	JEFFERSON		ALL (EVACUATION)	H.007181	$ 7,600,000.00
LA 1: CAMANIDA BAY TO ADMIRAL	RAISING ROADWAY GRADE	JEFFERSON	GRAND ISLE	ALL (EVACUATION)		
LA 1: LA 3090 - CAMINADA BAY	RAISING ROADWAY GRADE	JEFFERSON		FLOODING	H.010325	$ 825,000.00
LA 48 PED. IMPROVEMENTS, CITY OF HARAHAN	SIDEWALKS, DRAINAGE	JEFFERSON		FLOODING	H.013411	$ 465,300.00
LA 541 AND LA 560 2: JESSIE ST. TO LA 18	ADD DRAINAGE STRUCTURE	JEFFERSON		FLOODING	H.011547	$ 1,100,000.00
LAPALCO BLVD WIDENING, TANGLEWOOD TO VICTORY	WIDENING LAPALCO BLVD. FROM 2-LANES TO 3 LANES.	JEFFERSON		ALL (EVACUATION)	H.014316	$ 13,000,000.00

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
LAPALCO BRIDGE OVER HARVEY CANAL IMPROVEMENTS	CONSTRUCTION OF A NEW BASCULE BRIDGE & REHABILITATION OF THE EXISTING BRIDGE OVER THE HARVEY CANAL WILL INCREASE CAPACITY ON LAPALCO BLVD, A DESIGNATED EVACUTAION ROUTE	JEFFERSON		ALL (EVACUATION)	H.004396	$ 101,900,000.00
PETERS RD BRIDGE & EXTENSION	INSTALL BOX CULVERT IN MURPHY CANAL AND BUILD ACCESS RD	JEFFERSON		FLOODING	H.014581	$ 13,729,000.00
REHABILITATION OF CAUSEWAY BLVD/AIRLINE DR TRAFFIC CIRCLE, CAUSEWAY BLVD OVERPASS & RAMPS 4,5,6,7,&8	CLEANING & COATING OF STEEL STRUCTURE, REALIGNMENT OF SPANS, REPAIRS TO CONCRETE BENTS & RISERS, CONCRETE EPOXY SEALING, & BEARING REPLACEMENTS	JEFFERSON		HURRICANE AND TROPICAL STORMS, FLOODING		$ 33,900,000.00
REPLACEMENT OF THE TERRY PKWY BRIDGE OVER THE INDUSTRY CANAL (NB)	REPLACEMENT OF EXISTING 2-LANE TIMBER PILE BRIDGE ON A MAJOR COLLECTION ARTERY	JEFFERSON		HURRICANE AND TROPICAL STORMS, FLOODING		$ 10,000,000.00
REPLACEMENT OF THE W. METAIRIE BRIDGE OVER THE SONIAT CANAL (EB)	REPLACEMENT OF EXISTING 2-LANE TIMBER PILE BRIDGE ON A MAJOR COLLECTION ARTERY	JEFFERSON		HURRICANE AND TROPICAL STORMS, FLOODING		$ 20,000,000.00
RESERVOIRS/STORAGE TANKS	INSTALL RESERVOIRS/STORAGE TANKS	JEFFERSON		FLOODING		
RETENTION/DETENTION BASINS	INCREASE STORM WATER PROTECTION MANAGEMENT INCLUDING RETENTION AND DETENTION BASINS	JEFFERSON		FLOODING		
TRAFFIC ROUTES	IMPROVE AND/OR ELEVATE TRAFFIC ROUTES TO AID IN EVACUATION	JEFFERSON		ALL (EVACUATION)		
TREES IN RIGHTS-OF-WAY	DEVELOP A LOCAL TREE INVENTORY AND MAINTENANCE SCHEDULE FOR TREES LOCATED IN RIGHTS-OF WAY	JEFFERSON		FLOODING, SUBSIDENCE, EXTREME HEAT		

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
WIDENING OF E. AMES BLVD.	INCREASES ROADWAY WIDTH FROM 2-LANE TO 3-LANE IMPROVING TRAFFIC CONNECTIVITY TO HURRICANE EVACUATION ROUTES	JEFFERSON		ALL (EVACUATION)	H.007214	$ 11,900,000.00
BROAD ST @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
CANAL BLVD @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
CHEF MENTEUR HWY	RAISING ROADWAY TO MITIGATE FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
CHEF MENTEUR HWY @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
CITY PARK AVE @ I-10 UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
DOWNMAN RD @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
FEASIBILITY AND DESIGN STUDY FOR UNDERPASS STORMWATER MANAGEMENT	FEASIBIITY AND DESIGN FOR TO ADDRESS STORMWATER MANAGEMENT VIA GREEN AND GRAY INFRASTRUCTURE AT 12 UNDERPASS LOCATIONS	ORLEANS	NEW ORLEANS	FLOODING		
FRANKLIN AVE @ CSX RR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
GENERAL DEGAULLE DR @ CCC UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
GENTILLY BLVD @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
I-10 @ US 61 RAMP DRAINAGE	INSTALL DRAINAGE STRUCTURES	ORLEANS	NEW ORLEANS	FLOODING	H.016155	$ 110,000.00
I-610 INTERCHANGES (CANAL BLVD, ELYSIAN FIELDS)	SOLUTION NEEDED TO ADDRESS THE PONDING THAT OCCURS AT THE CANAL BLVD, GENTILLY BLVD. AND ELYSIAN FIELDS AVE INTERCHANGES	ORLEANS	NEW ORLEANS	FLOODING		
LAKEVIEW H&H 1: HARLEQUIN PARK	MODULAR TANK SYSTEM, FLOW SPLITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 5,170,000.00
LAKEVIEW H&H 10: CANAL BLVD	OPEN BOX CULVERT, UPSIZE BOX CULVERT	ORLEANS	NEW ORLEANS	FLOODING		$ 82,310,000.00
LAKEVIEW H&H 11: NEW BASIN CANAL	STORMWATER PARK, CONVEYANCE UPGRADES, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 9,600,000.00
LAKEVIEW H&H 12: KENILWORTH STREET	STORMWATER PARK, FLOW SPLITTER/CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 2,690,000.00
LAKEVIEW H&H 2: TOURMALINE PARK	MODULAR TANK SYSTEM, FLOW SPLITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 10,460,000.00
LAKEVIEW H&H 3A: TIARA AND PERIDOT PARK - INLINE	INLINE STORMWATER PARK ACTING AS A SURCHARGE POND, PIPE REROUTING, FLOW SPITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 19,630,000.00
LAKEVIEW H&H 3B: TIARA AND PERIDOT PARK - OFFLINE	OFFLINE STORMWATER PARK, PIPE REROUTING, FLOW SPITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 4,170,000.00

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
LAKEVIEW H&H 4: MARCONI LEVEE	STORMWATER PARK, FLOW SPLITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 1,810,000.00
LAKEVIEW H&H 5: UPPER WEST END	STORMWATER PARK, FLOW SPLITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 6,030,000.00
LAKEVIEW H&H 6: MOUTON STREET	MODULAR TANK SYSTEM, CONVEYANCE UPGRADES	ORLEANS	NEW ORLEANS	FLOODING		$ 4,560,000.00
LAKEVIEW H&H 7: HARRISON AVENUE	CONVEYANCE UPGRADES, PERMEABLE PAVEMENT, SUNKEN GARDENS	ORLEANS	NEW ORLEANS	FLOODING		$ 13,700,000.00
LAKEVIEW H&H 8: HYNES ELEMENTARY SCHOOL	MODULAR TANK SYSTEM, GREEN ROOF, BIOSWALES	ORLEANS	NEW ORLEANS	FLOODING		$ 8,940,000.00
LAKEVIEW H&H 9: GERMAIN STREET	MODULAR TANK SYSTEM, CONVEYANCE UPGRADES, FLOW SPLITTER STRUCTURE, FLOW CONTROL STRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		$ 3,500,000.00
MARCONI DR @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
MID CITY H&H 1: MODULAR STORAGE TANK AT WARREN EASTON FIELD AND RTA	SUBSURFACE STORMWATER STORAGE AT WARREN EASTON FIELD AND RTA TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 11,598,000.00
MID CITY H&H 2: MODULAR STORAGE TANK AT COMISKEY PARK	SUBSURFACE STORMWATER STORAGE AT COMISKEY PARK TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 4,620,000.00
MID CITY H&H 3: UPSIZE EXISTING PIPES ALONG CITY PARK AVE	UPSIZE DRAINAGE PIPES TO CONSISTENT 36" FROM I-10 TO ST. LOUIS ST	ORLEANS	NEW ORLEANS	FLOODING		$ 4,800,000.00
MID CITY H&H 4: MODULAR STORAGE ALONG NORMAN C FRANCIS	SUBSURFACE STORMWATER STORAGE AT NORMAN C FRANCIS PKWY TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 14,880,000.00

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
MID CITY H&H 5: MODULAR STORAGE TANK AT ST. PATRICK PLAYGROUND	SUBSURFACE STORMWATER STORAGE AT ST. PATRICK PLAYGROUND TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 9,960,000.00
MID CITY H&H 6: BIOSWALE AND MODUAR STORAGE AT MOUND PARK	SUBSURFACE STORMWATER STORAGE AT MCKAY PLAYSPOT AND ALONG MOUND STREET TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 25,200,000.00
MID CITY H&H 7: PERMEABLE GUTTERS NEAR BANKS ST	PERMEABLE GUTTERS ON SIDE STREETS IN THE VICINITY OF BANKS ST	ORLEANS	NEW ORLEANS	FLOODING		$ 9,480,000.00
MID CITY H&H 8: PERMEABLE GUTTERS AND BIOSWALE ALONG HOMEDALE ST	PERMEABLE GUTTERS AND BIOSWALES ALONG HOMEDALE ST	ORLEANS	NEW ORLEANS	FLOODING		$ 10,224,000.00
NEW ORLEANS STORMWATER MASTER PLAN	H&H STUDES OF DRAINAGE SUB-BASINS CITYWIDE TO IDENITFY GREEN AND GREY STORMWATER INFRASTRUCTURE	ORLEANS	NEW ORLEANS	FLOODING		
PARIS AVE @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
PRESS DR @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
S. CARROLLTON AVE @ I-10/AMTRAK (I-10 INTERCHANGE) UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
ST. BERNARD AVE @ NSRR UNDERPASS STORMWATER MANAGEMENT	CONSTRUCTION OF GREEN AND GRAY STORMWATER MANAGEMENT TO REDUCE FREQUENCY AND SEVERITY OF ROADWAY FLOODING	ORLEANS	NEW ORLEANS	FLOODING		
US 90: FLOODWALL - VICTORY RD.	RAISING ROADWAY GRADE TO CONSISTENT ELEVATION BY ADDING ASPHALT	ORLEANS	NEW ORLEANS	FLOODING	H.010331	

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
WEST END H&H 1: FLEUR DE LIS PARK SUBSURFACE RETENTION SYSTEM	SUBSURFACE STORMWATER STORAGE AT FLEUR DE LIS PARK TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 11,266,672.00
WEST END H&H 2: CENTER STREET GREEN INFRASTRUCTURE SOLUTIONS	PERMEABLE PAVEMENT FOR 2,99 LINEAR FEET OF CENTER STREET	ORLEANS	NEW ORLEANS	FLOODING		$ 8,736,082.00
WEST END H&H 3: DISPERSED GREEN INFRASTRUCTURE IMPROVEMENTS	BIORETENTION CELLS AND PERMEABLE PAVEMENT AT 11 INTERSECTIONS	ORLEANS	NEW ORLEANS	FLOODING		$ 12,764,275.00
WEST END H&H 4: BELLAIRE DRIVE GREEN INFRASTRUCTURE IMPROVEMENTS	INFILITRATION TRENCHES ALONG 1,824 LINEAR FEET OF BELLAIRE DR	ORLEANS	NEW ORLEANS	FLOODING		$ 14,977,895.00
WEST END H&H 5: HARRISON AVENUE SUBSURFACE RETENTION SYSTEM	SUBSURFACE STORMWATER STORAGE ALONG W. HARRISON AVE TO REDUCE FLOODING IMPACTS	ORLEANS	NEW ORLEANS	FLOODING		$ 6,825,797.00
LA 23 RAISING @ LAREUSSITE LEVEE	RAISING ROAD GRADE OVER LEVEE	PLAQUEMINES		FLOODING	H.015002	$ 880,000.00
PETERS RD BRIDGE, EXTENSION (PHASE 3)	NEW BRIDGE @ GIWW	PLAQUEMINES		ALL (EVACUATION)	H.008069	$ 73,630,980.00
PETERS RD. BRIDGE, EXT. PH 2B	APPROACHES FOR NEW BRIDGE	PLAQUEMINES		ALL (EVACUATION)	H.008068	$ 33,911,739.40
WIDENING LA 23 FROM HAPPY JACK THROUGH PORT SULPHUR FROM 2-LANES TO 4-LANES	WIDENING LA 23 THROUGH THIS SECTION WOULD GREATLY IMPROVE THE EVACUATION PROCESS.	PLAQUEMINES		ALL (EVACUATION)		$ 62,000,000.00
PATRICIA ST. @ AYCOCK ST.	REPLACE CULVERT WITH BRIDGE TO ENHANCE DRAINAGE FLOW	ST. BERNARD	ARABI	FLOODING		$ 1,925,000.00
GOLDEN DR. @ GENIE ST.	REPLACE CULVERT WITH BRIDGE TO ENHANCE DRAINAGE FLOW	ST. BERNARD	CHALMETTE	FLOODING		$ 2,540,000.00
DEBOUCHEL DR. @ JUDGE PEREZ DR.	REPLACE CULVERT WITH BRIDGE TO ENHANCE DRAINAGE FLOW	ST. BERNARD	MERAUX	FLOODING		$ 2,385,000.00
EVANGELINE ROAD FROM US 61 TO THE CN RAILROAD TRACKS	WHEN MODERATE TO HEAVY RAINFALL OCCURS, THIS SECTION OF EVANGELINE ROAD FLOODS AND IS OVERTOPPED, MAKING IT IMPASSABLE TO MOTOR VEHICLES. THIS IS A MAJOR ROUTE FOR HURRICANE EVACUATION AND FOR ACCESS TO US 61 AND LA 48.	ST. CHARLES	MONTZ	FLOODING		

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
I-10 ELEVATED SPILLWAY BRIDGE (FROM KENNER TO LAPLACE)	MULTIPLE PARISHES INCLUDING JEFFERSON PARISH, ORLEANS PARISH, LAFOURCHE PARISH AND TERREBONNE PARISH USE THIS AS A MAJOR HURRICANE EVACUATION ROUTE. THIS ROUTE IS USED FOR HAZARDOUS MATERIAL TRANSPORTATION FROM INDUSTRIAL FACILITIES. THIS SECTION OF I-10 NEEDS TO BE HARDENED TO AVOID SLABS FROM BEING DISPLACED FROM THE BRIDGE BENTS.	ST. CHARLES		ALL (EVACUATION)		
I-310 & US 90 INTERCHANGE	MULTIPLE PARISHES INCLUDING JEFFERSON PARISH, LAFOURCHE PARISH AND TERREBONNE PARISH USE THIS INTERCHANGE AS A MAJOR HURRICANE EVACUATION ROUTE. THE INTERCHANGE NEEDS TO BE EXPANDED TO ALLOW FOR BETTER TRAFFIC FLOW. THIS ROUTE IS ALSO USED FOR HAZARDOUS MATERIAL TRANSPORTATION FROM INDUSTRIAL FACILITIES.	ST. CHARLES	BOUTTE	ALL (EVACUATION)	H.010753	

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
JUDGE EDWARD DUFRESNE PARKWAY EXTENSION	NUMEROUS ESSENTIAL BUSINESSES AND PARISH FACILITIES ARE LOCATED SOUTH OF THE UP RAILROAD ON JUDGE EDWARD DUFRESNE PARKWAY. CURRENTLY, THE ONLY ACCESS TO THIS AREA IS FROM LA 18 (RIVER ROAD). EXTENDING THE ROADWAY SOUTH FROM ITS CURRENT TERMINUS TO LA 3127 WILL PROVIDE A SECOND ACCESS TO THIS CRITICAL AREA AND HELP REDUCE TRAFFIC CONGESTION AT LA 18 DURING HURRICANE RECOVERY OPERATIONS.	ST. CHARLES	LULING	ALL (ALTERNATIVE ACCESS)		$8 TO $10 MILLION
LA 18 - AMA (ST. MARKS CHURCH TO THE DAVIS POND DIVERSION)	WHEN MODERATE TO HEAVY RAINFALL OCCURS, WATER PONDS IN MULTIPLE AREAS ALONG THIS STRETCH OF LA 18, MAKING THE ROADWAY HAZARDOUS OR IMPASSABLE TO MOTOR VEHICLES. LA 18 IS A MAJOR ROUTE FOR HAZARDOUS MATERIAL TRANSPORTATION FROM INDUSTRIAL FACILITIES AND FOR HURRICANE EVACUATION.	ST. CHARLES	AMA	FLOODING		
LA 18 - HAHNVILLE (FROM SANDERS LANE TO BETHLEHEM LANE)	WHEN MODERATE TO HEAVY RAINFALL OCCURS, WATER PONDS IN MULTIPLE AREAS ALONG THIS STRETCH OF LA 18, MAKING THE ROADWAY HAZARDOUS OR IMPASSABLE TO MOTOR VEHICLES. LA 18 IS A MAJOR ROUTE FOR HAZARDOUS MATERIAL TRANSPORTATION FROM INDUSTRIAL FACILITIES AND FOR HURRICANE EVACUATION.	ST. CHARLES	HAHNVILLE	FLOODING		

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
LA 18 & JACKIE BEE ROAD IN LULING	WHEN MODERATE TO HEAVY RAINFALL OCCURS, WATER PONDS IN MULTIPLE AREAS ALONG THIS STRETCH OF LA 18, MAKING THE ROADWAY HAZARDOUS OR IMPASSABLE TO MOTOR VEHICLES. LA 18 IS A MAJOR ROUTE FOR HAZARDOUS MATERIAL TRANSPORTATION FROM INDUSTRIAL FACILITIES AND FOR HURRICANE EVACUATION.	ST. CHARLES	LULING	FLOODING		
LA 3060 (BARTON AVENUE) BETWEEN LA 18 AND UP RAILROAD TRACKS	THIS SECTION OF LA 3060 FLOODS DURING MODERATE TO HEAVY RAIN EVENTS MAKING IT IMPASSABLE TO MOTOR VEHICLES. LA 3060 IS A MAJOR ROUTE FOR HURRICANE EVACUATION AND PROVIDES A CRITICAL LINK BETWEEN LA 18 AND US 90.	ST. CHARLES	LULING	FLOODING		
LA 48 & IMTT IN ST. ROSE	WHEN MODERATE TO HEAVY RAINFALL OCCURS, WATER PONDS IN THIS STRETCH OF LA 48, MAKING THE ROADWAY HAZARDOUS OR IMPASSABLE TO MOTOR VEHICLES. LA 48 IS A MAJOR ROUTE FOR HAZARDOUS MATERIAL TRANSPORTATION FROM INDUSTRIAL FACILITIES AND FOR HURRICANE EVACUATION.	ST. CHARLES	ST. ROSE	FLOODING		
ORMOND BLVD BETWEEN LA 48 & CN RAILROAD TRACKS IN DESTREHAN	ORMOND BOULEVARD BECOMES FLOODED DURING MODERATE TO HEAVY RAINFALL EVENTS, WHICH PREVENTS RESIDENTS AND FIRST RESPONDERS FROM ACCESSING THE ORMOND AREA, LA 48 AND US 61. THIS IS MAJOR ROUTE FOR HURRICANE EVACUATION ANDF FOR ACCESS TO LA 48 AND US 61.	ST. CHARLES	DESTREHAN	FLOODING		

NAME	DESCRIPTION	PARISH	CITY	HAZARD(S) ADDRESSED	SPN	COST ESTIMATE
SPILLWAY ROAD	HARDEN THE SOUTHERN SIDE OF THE ROADWAY TO PROTECT AGAINST WATER FLOW WHEN THE BONNET CARRE' SPILLWAY IS OPENED. THIS ROADWAY PROVIDES A CRITICAL LINK BETWEEN THE CITIES OF MONTZ AND NORCO.	ST. CHARLES	NORCO	FLOODING		
US 90 - PARADIS CANAL	WHEN THE PROPOSED BARGE GATE IS CONSTRUCTED, US 90 WILL HAVE A POTENTIAL FOR FLOODING FROM RAINFALL. THIS ROADWAY IS A MAJOR ROUTE FOR HURRICANE EVACUATION.	ST. CHARLES	PARADIS	FLOODING		
LA 3127	LA 3127 IS SUSCEPTIBLE TO FLOODING FROM STORM SURGE. THIS ROADWAY IS A MAJOR ROUTE FOR HURRICANE EVACUATION AND PROVIDES ACCESS TO I-310, LA 18 AND US 90.	ST. CHARLES	HAHNVILLE	FLOODING		
GRADE RAISING ON LA 1077	ROADWAY DRAINAGE	ST. TAMMANY		FLOODING	H.010441	$ 2,200,000.00
LA 1078: LA 25 - LA 1077	MINOR WIDEN/ DRAINAGE	ST. TAMMANY		FLOODING		$ 4,400,000.00
LA 1088: I 12 - LA 36	MINOR WIDEN/ DRAINAGE	ST. TAMMANY		FLOODING		$ 2,750,000.00
US 90 PEARL RIVER BRIDGE REPLACEMENT	REPLACEMENT OF EXISTING BRIDGE ON EVACUATION ROUTE	ST. TAMMANY		ALL (EVACUATION)		
LA 1063: GLENDALE DR. - US 51 DRAINAGE	ADDITIONAL PIPE(S), CATCH BASINS, AND OR ASPHALT	TANGIPAHOA		FLOODING	H.011519	$ 242,000.00
LA 16: N 2ND ST TO E. OF DUNCAN AVE	DRAINAGE IMPROVEMENTS, IN-PLACE BASE REHAB AND OVERLAY	TANGIPAHOA		FLOODING	H.009425	$ 7,700,000.00