

# HURRICANE EVACUATION ANALYSIS

**PREVIEW AND ISSUES**

*Presented To  
Brazoria, Galveston, and Harris Counties*

*Presented By*

**PBSJ**

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# Clearance Time Model Process

## HAZARDS DATA

- Land Areas Flooded for Hurricane Categories
- Public Shelter Vulnerabilities
- County Evacuation Areas
  - Category 1-2
  - Category 3
  - Category 4-5

## SOCIOECONOMIC / BEHAVIORAL ASSUMPTIONS

- Housing Unit Data
  - Permanent Occupied
  - Mobile Homes
  - Seasonal Units
- Vehicle Ownership
- Behavioral
  - Participation rates
  - Destination percentages
  - Response rates
  - Vehicle usage

## PUBLIC SHELTER INFORMATION

- Locations
- Capacities

## TRANSPORTATION ANALYSIS

## ROADWAY NETWORK

- Number of lanes by segment
- Facility types
- Bridge locations / operations
- Traffic count data
- Intersection operations

## EVACUATION ZONES / RISK AREAS / SCENARIOS

## EVACUATION ROAD NETWORK / VEHICLE BY SEGMENT

## NUMBERS OF EVACUATING PEOPLE / PUBLIC SHELTER DEMAND

## CRITICAL ROADWAY SEGMENTS AND INTERSECTIONS

## CLEARANCE TIMES

## SUMMARY REPORT

## MODEL SUPPORT DOCUMENT

## ABBREVIATED VERSION OF MODEL

## ARCVIEW GIS GRAPHICS

# Current Corps of Engineers HES Clearance Time Model Structure

Items in **BLACK** indicate user-controlled data.  
 Items in **RED** indicate calculated values.  
 Tabs with **Yellow Background** are included in ATM.

**Socioeconomic**  
*by Evacuation Zone/Risk Area*

Permanent Occupied Dwelling Units	Number of units Vehicles per unit Persons per unit
Mobile Home Units	Number of units Vehicles per unit Persons per unit
Seasonal (Tourist) Units	Number of units Vehicles per unit Persons per unit Occupancy Level

**Behavioral**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Participation Rates	Permanent Occupied Dwelling Units High Rise Units Seasonal Units
Permanent Resident Destinations	Public Shelter Out of County Local Residence Hotel / Motel
Vehicle Usage	Permanent Residence / High Rise Tourist
Tourist Destinations	Public Shelter Out-of-County

**Evacuating Statistics**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Evacuating People

Public Shelter Demand

Evacuating Vehicles to Public Shelters

Evacuating Vehicles to Friends/Relatives

Evacuating Vehicles to Hotels/Motels

Evacuating Vehicles Out-of-County

**Public Shelter Distribution**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Vehicle Trips to Public Shelters

Shelter Capacity (Persons)

Persons per Vehicle

Shelter Capacity (Vehicles)

Percentage of Shelter Used

Zone-to-Zone Distribution (%)

**Friends/Relatives Distribution**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Vehicle Trips to Friends/Relatives

Population Factor

Distance Factor

**Hotel/Motel Distribution**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Vehicle Trips to Hotels/Motels

Hotel Capacity (Persons)

Persons per Vehicle

Hotel Capacity (Vehicles)

Percentage of Hotels/Motels Used

Zone-to-Zone Distribution (%)

**Out-of-County Distribution**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Vehicle Trips Out-of-County

Exit Point Distribution (%)

**Total Trip Distribution**  
*by Evacuation Zone/Risk Area  
 by Storm Scenario  
 by Tourist Occupancy Level*

Public Shelter Zone-to-Zone Distribution

Hotel/Motel Zone-to-Zone Distribution

Friends/Relatives Zone-to-Zone Distribution

Out-of-County Zone-to-Zone Distribution

Total Zone-to-Zone Distribution

**Evacuating Vehicles by Roadway Segment**  
*by Network Link  
 by Storm Scenario  
 by Tourist Occupancy Level*

Network Link Description

Total Evacuating Vehicles by Link

Service Volume

Evacuating Vehicles to Service Volume Ratio

External Traffic

Evacuating Vehicles from Local Zones

Zone-to-Zone Distribution

**Clearance Times**  
*by Network Link  
 by Storm Scenario  
 by Tourist Occupancy Level*

Critical Link Evacuating Vehicles

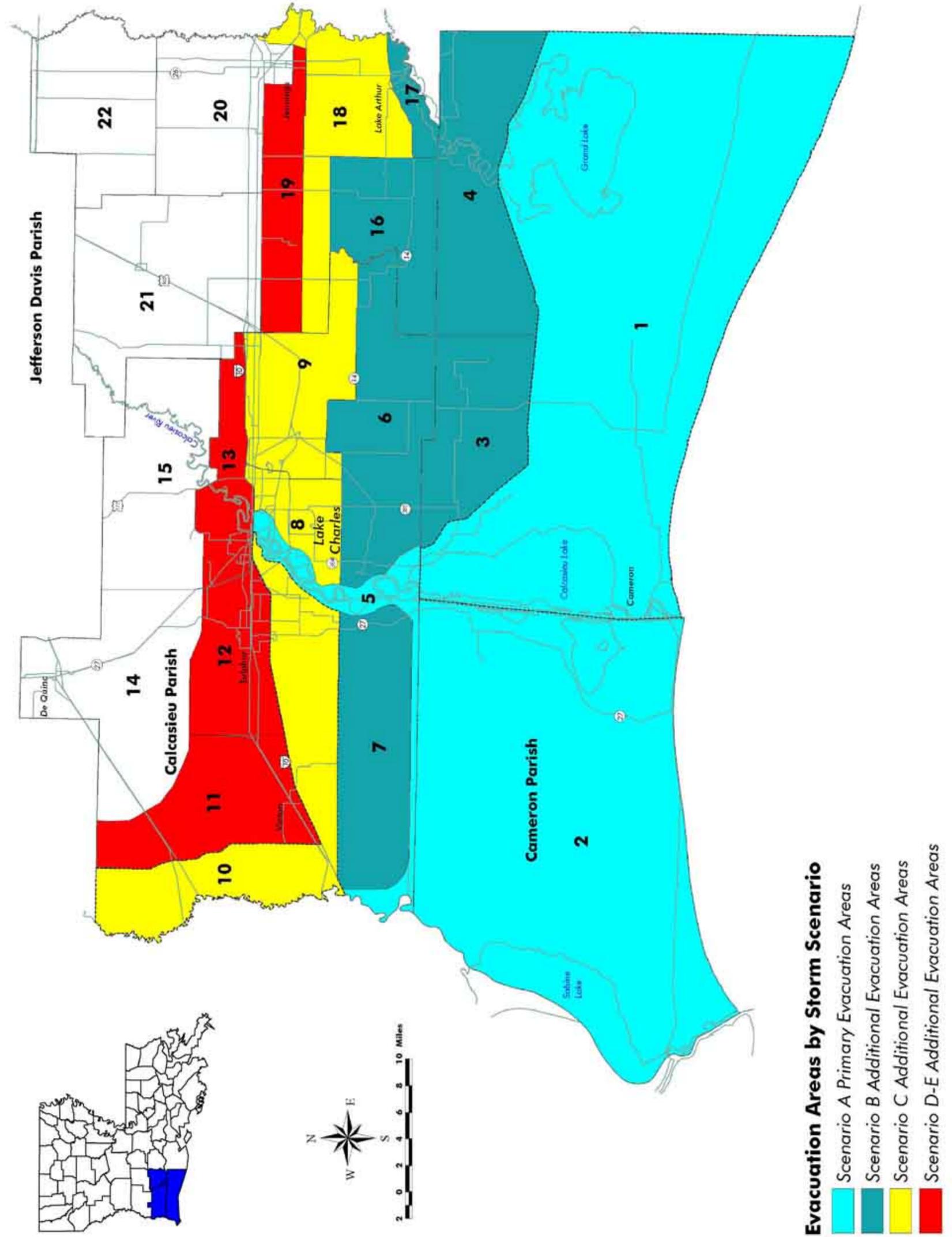
Variable Service Volume During Evacuation

Clearance Time by Response Rate

Worst Individual Household Commute Time

# Traffic Evacuation Zones

Figure 2-1



# Evacuation Traffic Congestion

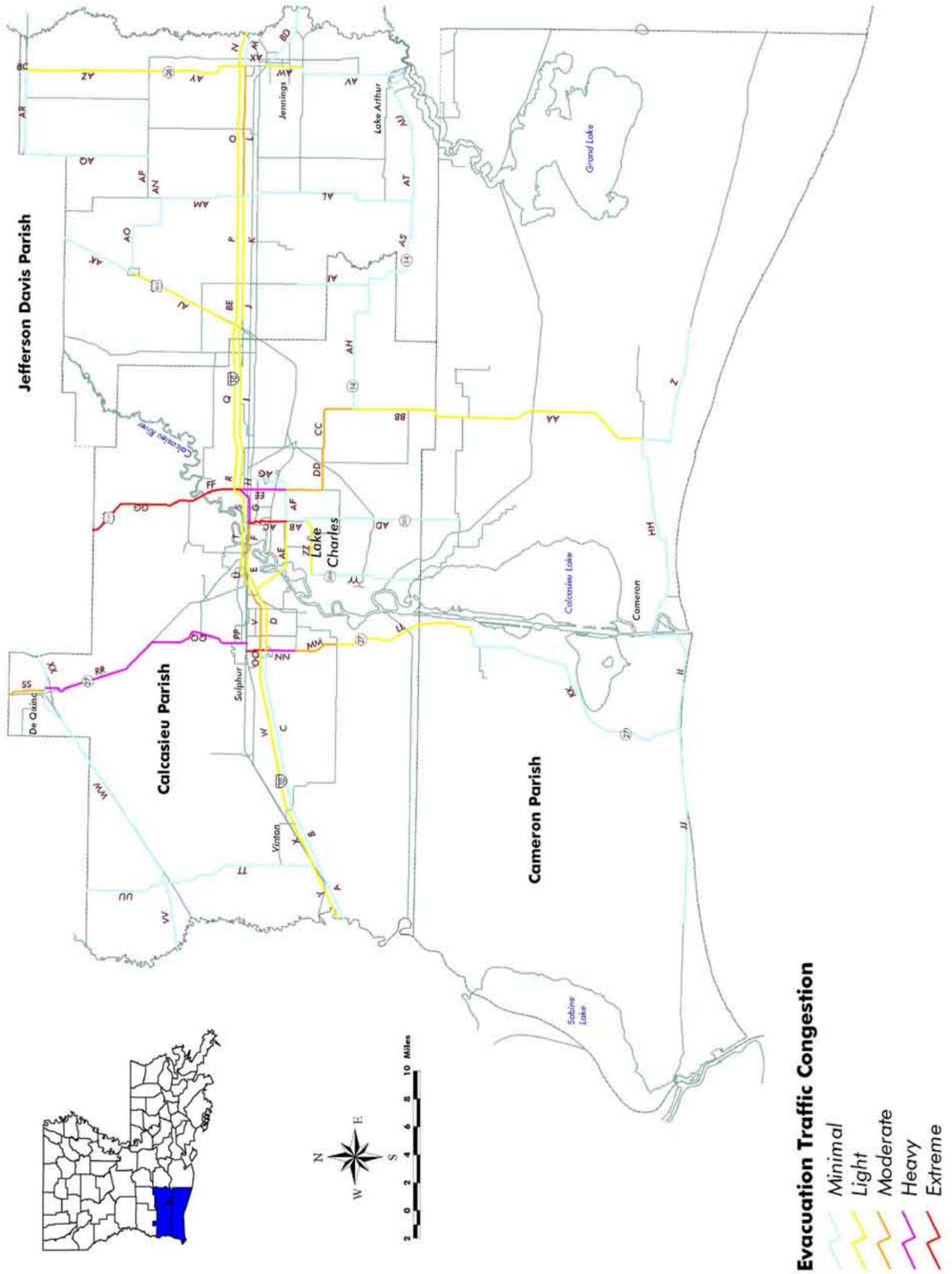
Scenario D-E

High Tourist Occupancy

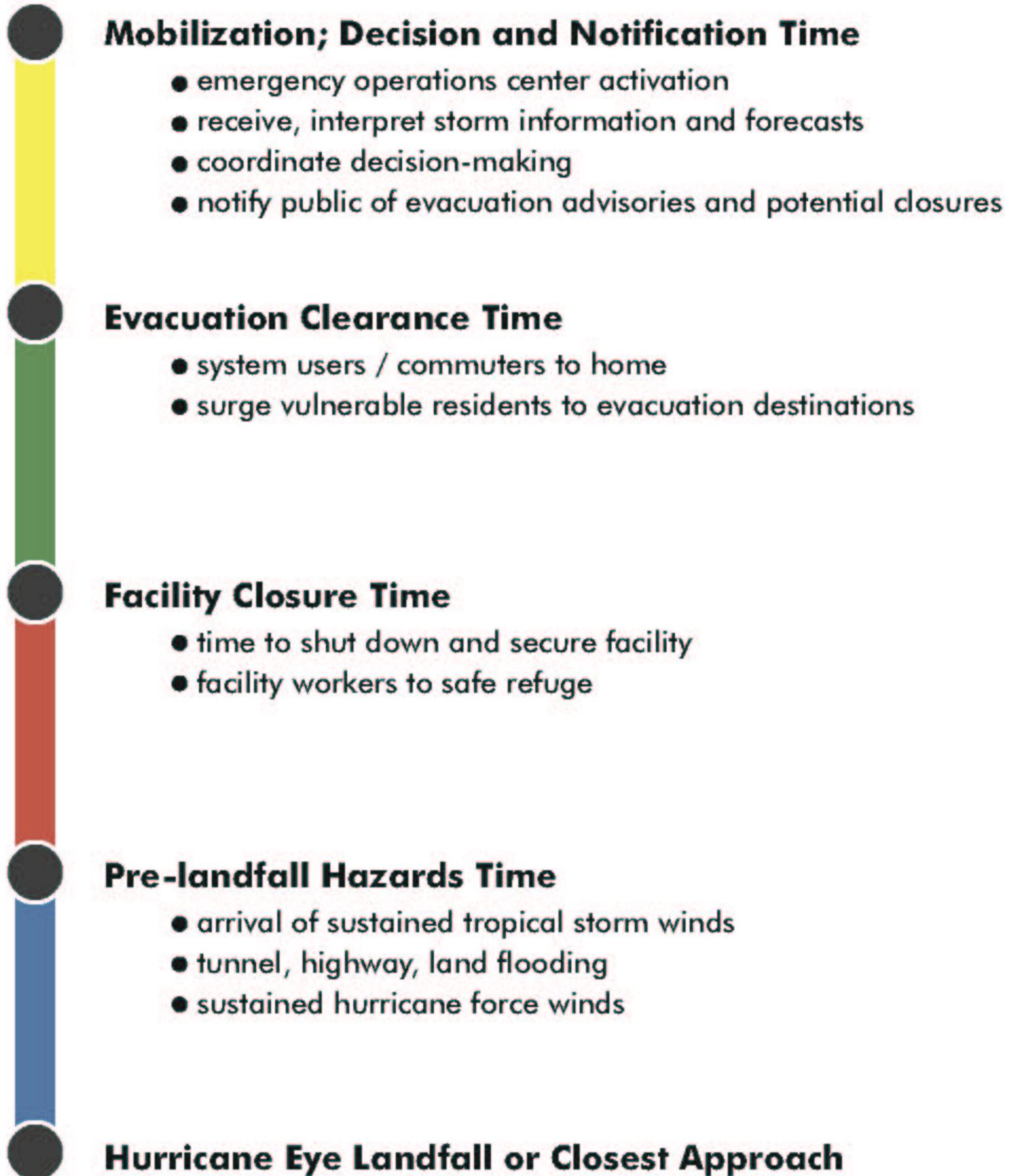
Figure 3-19

Calcasieu Parish  
Cameron Parish  
Jefferson Davis Parish

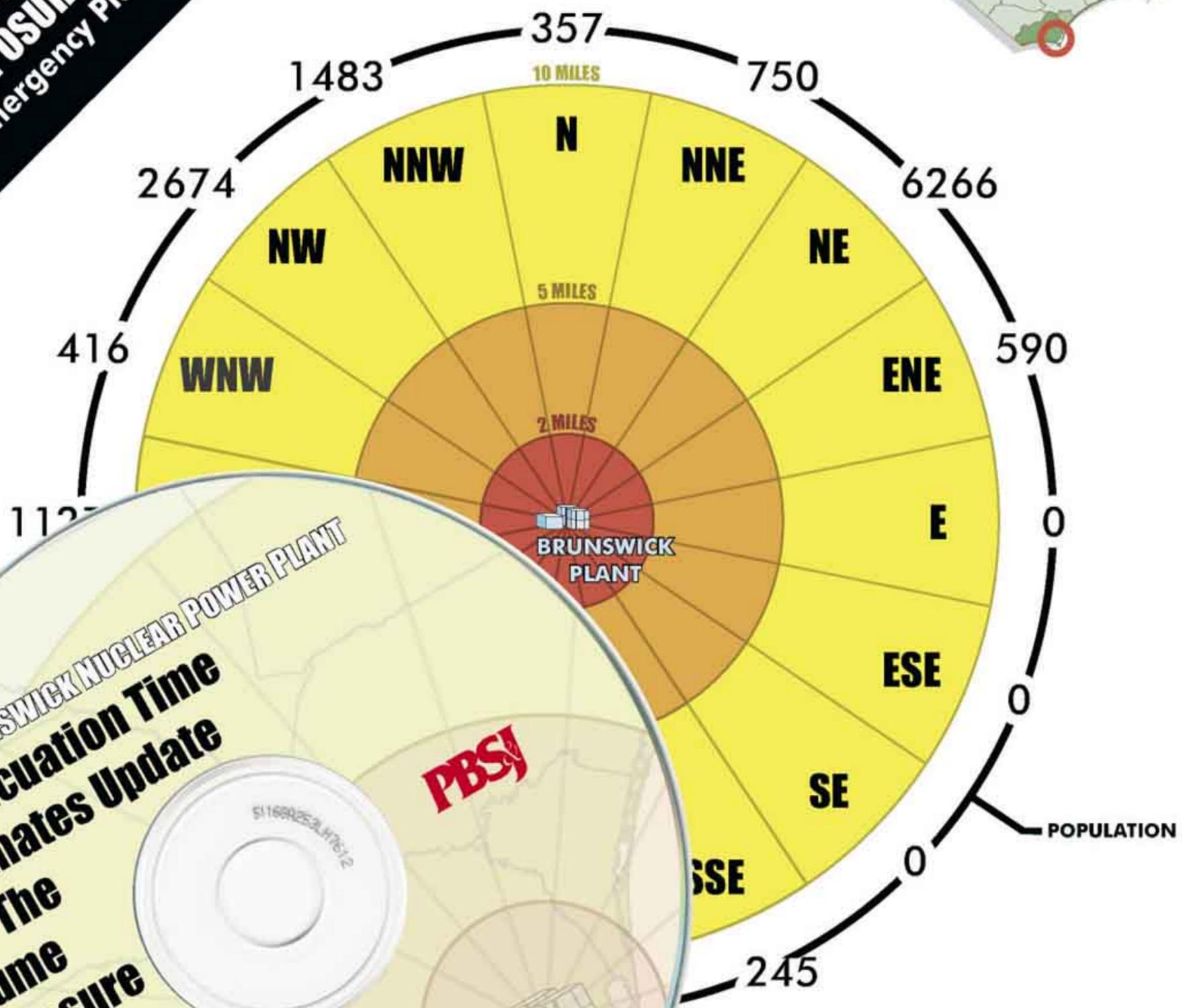
Southwest Louisiana Evacuation Study - 2000



# **Hurricane Emergency Response Transportation Agency Critical Time Lines**



**BRUNSWICK SITE  
PLUME EXPOSURE PATHWAY  
10-Mile Emergency Planning Zone**



**RESIDENT POPULATION TOTALS**

From Site	Population	Distance From Site	Cumulative Population
0-2 miles	1074	0-2 miles	1074
2-5 miles	5697	0-5 miles	6771
5-10 miles	18848	0-10 miles	25619

**Total Segment Population 0-10 miles = 25619**

# PBS&J Evacuation Planning Projects

Projects	Hazards / Storm Surge Analysis	Transportation Analysis	Evacuation Decision Making / Behavioral Issues	Post-Storm Assessment	Multimodal Multicultural Issues
Metro New York Hurricane Transportation Study		●			●
Lower Southeast Florida Hurricane Evacuation Study	●	●	●		
Post-Andrew Evacuation Assessment - Florida				●	
Dade County Contingency Procedures 1992		●			
Southeast Louisiana Hurricane Evacuation Study		●			
Treasure Coast Hurricane Evacuation Study	●	●	●		
Monroe County Comprehensive Plan Hurricane Element		●			
Lee County, Florida Hurricane Evacuation Traffic Model		●			
Northeast Florida Hurricane Evacuation Study		●			
Oahu Hurricane Vulnerability Study		●			
Tristate Hurricane Evacuation Study	●	●	●		●
Puerto Rico South Coast Hurricane Study	●	●	●		●
Georgia Coastal Hurricane Evacuation Study		●			
South Carolina Hurricane Evacuation Study		●			
North Carolina Hurricane Evacuation Study	●	●	●		●
Virginia Coastal Hurricane Evacuation Study	●	●			
Maryland Hurricane Evacuation Study		●			
Delaware Hurricane Evacuation Study		●			
New Jersey Hurricane Evacuation Study		●			●
New York - Long Island Hurricane Evacuation Study	●	●			
Post-Hugo Evacuation Assessment				●	
Post-Iniki Evacuation Assessment				●	
Post-Andrew Evacuation Assessment - Louisiana				●	
Cape Canaveral Storm Surge Atlas	●				
Dade County Transportation Systems Hurricane Emergency Preparedness Study	●	●	●		●
Brunswick Nuclear Power Plant Evacuation Study		●			
Post-Floyd Evacuation Assessment				●	
Web-Based Evacuation Traffic Information System		●	●		
Islands Mass Management Tool	●	●	●		●
Bi-State (Mississippi / Louisiana) Study		●	●		