

Flood Warning Infrastructure and Funding Pathways

Leaf and Bouie River Corridor — Hattiesburg, Petal, and Forrest County

Document type: Reference note — Leaf and Bouie Redevelopment District, pre-development research

Prepared by: Michael Hoffman, North Star Group, Inc. **Date:** April 24, 2026 **Audience:** Planners, engineers, elected officials, grant administrators, civic stakeholders

The Elevated Roadway Requirement

Floodway subdivision in Hattiesburg carries a roadway elevation requirement rooted in life-safety: access routes must be elevated above flood elevation so residents can evacuate and emergency responders can enter during a flood event. The applicable code framework is the Hattiesburg Land Development Code §9.3 (Floodplain Management), cross-referenced from §4.7.1.1 and §6.1.1, together with the City's Flood Damage Prevention Ordinance.

The engineering approach embedded in that requirement dates from when the code was written. It addresses the life-safety concern directly in the physical infrastructure.

Two consequences follow for floodway development:

Cost. Elevated roadways at a development scale are expensive. The civil engineering cost of raising access road grades above flood elevation — earthwork, structural fill, drainage, and the associated right-of-way geometry — adds materially to horizontal development cost relative to a conventional upland subdivision. A site-specific estimate requires survey data and an engineer's takeoff; no general figure is offered here. What is consistent across floodway development contexts is that the elevation premium is large enough to affect project feasibility at typical residential land economics.

No-rise complexity. Elevated roads on piers or columns introduce structural elements into the floodway cross-section. Those structural elements are potential obstructions to flow. FEMA's no-rise standard requires that floodway development not increase the Base Flood Elevation upstream. Pier and column foundations create a modeling obligation: the developer must demonstrate in a hydraulic study (typically a HEC-RAS model) that the structures do not raise the BFE. The more structural elements placed in the floodway, the more complex and uncertain that analysis becomes — and the more costly to engineer. This is a compounding problem: the infrastructure required to address life-safety also creates the hydraulic complication that the no-rise certification must address.

The Alternative Approach

Several CRS (Community Rating System) communities have addressed the same life-safety concern from the opposite direction: instead of engineering access roads that are passable during flood events, they invest in flood warning infrastructure that delivers evacuation lead time *before* inundation reaches access routes.

The premise is substitution: if residents and emergency responders receive reliable warning with enough lead time to evacuate, the life-safety outcome is the same or better — without elevated roads, and without the pier/column obstructions that generate no-rise complexity.

System design. A three-layer warning system — sensing, processing, alerting — operates as follows:

Sensing: Water level gauges on the Leaf River at the site and at corridor points, with rainfall monitoring stations. Gauges transmit data continuously over cellular networks to a central controller, with radio backup. The gauges integrate with the existing USGS streamgage network and National Weather Service river forecasting data at the Leaf River gauge (USGS 02473000, U.S. Highway 11 at Hattiesburg).

Processing: A weatherproof controller with cellular connection and battery/solar backup reads sensor data against watch and warning thresholds set in coordination with the City's floodplain program. The controller publishes live river levels to a public-facing web page.

Alerting: When a warning threshold is crossed, four channels activate in parallel — outdoor sirens with strobe lights at site and corridor points; digital message signs at access points and the East Hardy Street bridge corridor; federal wireless emergency alerts delivered to every phone in the affected cell-tower footprint (through the City's existing emergency management authorization, no installation cost); and direct notification to the development's HOA management and City emergency dispatch.

The precedent. FEMA's case study of Roseville, California — the first Class 1 CRS community in the United States — documents the most cited outcome. During a 100-year flood event in 1995, before their early warning system was installed: over 300 water rescues. During a comparable 100-year event in 1997, after installation: zero water rescues.¹ The system provided evacuation lead time that eliminated the life-safety incident. The physical infrastructure of the access road did not change.

Cost comparison. The planning-level capital range for a three-layer warning system with backbone at a riverfront site plus four corridor points along the Leaf River corridor is commonly \$650,000–\$2,000,000, depending on final siting and scope. A lean version — sirens at corridor points plus one message sign at the East Hardy/Leaf River bridge approach — lands near the lower end of that range. (See companion document in this library: *Alarm System Design and Order-of-Magnitude Cost.*)

The comparison:

Approach	Capital range	No-rise complexity	Floodway obstruction
Elevated roadways	Site-specific; requires engineer takeoff	High — piers/ columns in channel	Present — must be modeled
Warning system	\$650,000–\$2,000,000 (planning-level; see companion <i>Alarm System Design</i> doc)	None	None

District-Wide Applicability

This is not exclusively an Eagles Flock problem. The Leaf and Bouie River Development District — established under Mississippi HB 1649 (2020), covering 1,316 parcels across both sides of the Leaf and Bouie rivers through Hattiesburg, Petal, and Forrest County — contains floodway and floodplain land along the entire corridor. Any development within that geography that involves floodway access faces the same elevated-road requirement and the same no-rise modeling obligation.

A flood warning system installed along the Leaf River corridor would serve the entire district, not a single development. That is the correct unit of analysis for both the infrastructure investment and the grant application.

Area Demographics

The district corridor is economically distressed by any federal measure. Hattiesburg's poverty rate is approximately 28% (ACS 2022 5-year estimate); median household income for the city is approximately \$41,000–\$46,000 depending on the survey year. Forrest County's median household income was \$52,821 in 2023 with 16.5% of families in poverty (U.S. Census Bureau, 2023 SAIPE estimate). Mississippi ranks among the lowest states nationally in median household income.

This demographic profile is directly relevant to federal grant scoring. BRIC's National Competition prioritizes disadvantaged communities. HMGP explicitly weights projects that serve populations with high social vulnerability. HUD CDBG-DR's Low-to-Moderate Income (LMI) requirements require that the majority of beneficiaries fall at or below 80% of Area Median Income — a threshold Hattiesburg's corridor population routinely meets.

Funding Pathways

Multiple federal mechanisms are available concurrently. They are not mutually exclusive; some can be stacked.

1. FEMA BRIC — Building Resilient Infrastructure and Communities Application period: March 25 – July 23, 2026 (FEMA Notice of Funding Opportunity, March 25, 2026). Pool: \$1 billion nationally. Flood warning infrastructure is explicitly eligible. Cost share: 75% federal / 25% non-federal. Applicant: City of Hattiesburg or Forrest County, through the Mississippi Emergency Management Agency (MEMA). BRIC's National Competition prioritizes infrastructure projects, disadvantaged communities, and pre-disaster mitigation — all three descriptors fit.

2. FEMA HMGP — Hazard Mitigation Grant Program HMGP is triggered by Presidential disaster declarations, not an annual application cycle. Two current declarations cover the area:

- **DR-4790-MS** (June 10, 2024) — severe storms, tornadoes, and flooding, April 8–11, 2024. Declaration language: *"All areas within the State of Mississippi are eligible for assistance under the Hazard Mitigation Grant Program."* Forrest County is in Mississippi. HMGP funds remain available for eligible projects under open declarations.
- **DR-4874-MS** (May 21, 2025) — severe storms, tornadoes, and flooding, March 14–15, 2025. Forrest County explicitly designated as an affected area.

HMGP cost share: 75% federal / 25% non-federal, same as BRIC. The non-federal match does not need to be cash — in-kind services or materials qualify. Local governments send a Notice of Intent to MEMA at mitigationgrants@mema.ms.gov; a MEMA mitigation specialist contacts the applicant. The City of Hattiesburg used HMGP in 2020 for a flood-prone residential acquisition project in Forrest County, establishing a working relationship with MEMA.

3. USGS Cooperative Matching Funds (CMF) The USGS CMF Program provides up to a 50% federal match with state and local partners for streamgage installation and operation through a joint funding agreement with the USGS Mississippi Water Science Center — not a competitive grant. This mechanism applies specifically to the sensing layer of the warning system (gauges on the Leaf River). The USGS already operates a streamgage at the Leaf River/U.S. Highway 11 crossing; adding or integrating corridor

gauges fits the program's standard cooperative structure. This reduces the capital cost that BRIC or HMGP must cover.

4. HUD CDBG-DR — Community Development Block Grant Disaster Recovery CDBG-DR requires a Presidential disaster declaration and a Congressional appropriation; it is not a standing annual grant. Mississippi received CDBG-DR allocations following Hurricane Katrina (2005) and has a track record with the program. A new CDBG-DR allocation following DR-4874 or a future declaration could provide infrastructure improvement funding for the corridor. Importantly, CDBG-DR funds are explicitly authorized to serve as the non-federal match for FEMA HMGP awards — eliminating the need to source 25% match from the district's own ad valorem reserves.

5. Leaf and Bouie River Development District — Match and Operations Mississippi HB 1649 (2020) authorizes each member authority to divert 15%–100% of ad valorem taxes collected within the district boundary for infrastructure, recreation, planning, and economic vitality, and to receive and expend revenues from federal and state grants. The district's annual ad valorem pool across all three member authorities has been accumulating since 2021. The district is the natural vehicle for the non-federal match if CDBG-DR is not available, and for ongoing annual operations costs (commonly 5–10% of installed capital) after federal construction funding ends.

Illustrative BRIC / HMGP Application Outline

The following outlines what a winning subapplication would need to establish. It is illustrative — not a completed application.

Project title (illustrative): Leaf River Corridor Flood Warning and Evacuation Alert System — Hattiesburg/Forrest County, MS

Applicant: City of Hattiesburg (or Forrest County as co-applicant)

Program: BRIC National Competition (FY2024/2025), or HMGP under DR-4874-MS

Project description: Installation of a multi-layer flood warning system along the Leaf River corridor through Hattiesburg, from Eagles Flock at the south to the East Hardy Street bridge at the north. System includes river-stage gauges at three to four sites, rainfall monitoring, a central processing controller, outdoor sirens and digital message signs at access points, and integration with the federal wireless emergency alert system. The system delivers real-time river-stage data to a public web dashboard and automated evacuation warnings to residents and emergency dispatch.

Life-safety nexus: The Leaf River floods Hattiesburg with a frequency that has produced property damage and water rescues. The 1983 flood reached a stage of 29.19 feet and caused over \$32 million in damages (1983 dollars). Modern elevated-roadway standards address the evacuation safety concern through infrastructure; this project addresses the same concern through warning lead time. Roseville, California's documented outcome — zero water rescues during a 100-year event after system installation versus 300+ before — is the relevant precedent.

Community vulnerability: Hattiesburg's poverty rate of approximately 28% (ACS) and median household income below \$47,000 place the city well within the LMI thresholds for BRIC disadvantaged community scoring and HMGP social vulnerability weighting. Forrest County's family poverty rate of 16.5% (2023 SAIPE) is elevated relative to national averages.

Benefit-cost: Federal grant programs require a benefit-cost ratio ≥ 1.0 . For flood warning systems, avoided property damage and eliminated water rescue costs both count as benefits. The City's existing CRS Class 7 rating means every additional CRS class improvement reduces NFIP premiums by 5% for all properties inside the Special Flood Hazard Area — a recurring, monetizable benefit that accrues to residents at income levels that make flood insurance a significant household expense.

Non-federal match: Leaf and Bouie River Development District ad valorem reserve and annual contributions, or CDBG-DR funds if a qualifying allocation is available.

Stacking potential: USGS CMF for the sensing layer (up to 50% of gauge installation costs); BRIC or HMGP for processing and alerting infrastructure; district funds for ongoing operations. The three sources address different cost layers without creating prohibited duplication of benefits.

MEMA contact for subapplication intake: mitigationgrants@mema.ms.gov

Code Reference

The elevated roadway standard at issue is addressed under: - Hattiesburg LDC §9.3 — Floodplain Management - LDC §6.1.1 and §4.7.1.1 — dimensional standards cross-reference for regulatory floodway development in A-1 zone - Hattiesburg Flood Damage Prevention Ordinance (incorporated by reference in the LDC)

The warning system approach does not amend or waive these standards. It addresses the life-safety concern that the standards were designed to protect against through a different mechanism — one that regulators in other CRS communities have accepted as functionally equivalent or superior. Any application of this approach to Eagles Flock or other floodway development in the corridor would require a determination by the City's floodplain administrator that the warning system, as designed and operated, satisfies the life-safety intent of the access standard. That determination is a regulatory question for the City's floodplain program, not a developer's unilateral claim.

Supporting Documents in This Library

- *Flood Warning Infrastructure — Concept Note* — CRS precedents and candidate corridor points
 - *Alarm System Design and Order-of-Magnitude Cost* — Three-layer design, capital ranges
 - *Flood Warning and Response Plan — Reference Materials* — CRS 600-series self-assessment, FEMA case studies
 - *Community Rating System Implications* — CRS class improvement and insurance savings analysis
-

Footnotes

¹ Federal Emergency Management Agency, *Community Rating System Saves Dollars, Property and Lives* — City of Roseville, California. <https://www.fema.gov/case-study/community-rating-system-saves-dollars-property-and-lives>

Sources: U.S. Census Bureau ACS 5-year estimates (2022); Census Bureau SAIPE (2023); FEMA Disaster Declarations DR-4790-MS (June 10, 2024) and DR-4874-MS (May 21, 2025); Mississippi HB 1649 (2020); FEMA BRIC NOFO (March 25, 2026); MEMA Hazard Mitigation Program; USGS

*Cooperative Matching Funds Program; Hattiesburg LDC March 17, 2026 edition; FEMA CRS
Coordinator's Manual (2021); Hattiesburg Floodplain Management Program (hattiesburgms.com).*