

NMDOT Resilience Improvement Plan

02.28.2023



Agenda

- Project Background
- Task #2: State and Local Plan Review
- Task #3: Data Update and Assessment
- Next Steps
- Questions and Discussion

Project Background

NMDOT seeks to develop a Resilience Improvement Plan to meet the requirements and cost share incentive of the PROTECT Formula Program. In alignment with the PROTECT program guidance and in support of the New Mexico Governor's climate action initiative, NMDOT will build on the Resiliency 1.0 Study to integrate new data sources into the GIS-based analysis framework, apply likelihood and probability analysis, integrate guidance from FHWA Vulnerability Assessment and Adaptation Framework, and identify key priorities for each NMDOT district.

Federal Guidance for Resilience Improvement Plans

A Resilience Improvement Plan should:

- **Be consistent with other plans and processes**
 - Be developed as an integral part of State and MPO transportation planning processes
 - Be regularly updated
 - Cover a period at least as long as the relevant LRTP, MTP or asset management plan
 - Be informed by risk-based TAMPs, evaluations of repeatedly damaged facilities, and state freight plans
 - Be consistent with state and local hazard mitigation plans
- **Be both tactical and strategic**
 - Include immediate *and* long-range planning activities and investments
 - Demonstrate a systemic approach to resilience, ideally across modes, geographic regions, and critical interdependent sectors
 - Address a full range of current and future weather events and natural disasters
- **Reflect best practices in resilience analysis**
 - Identify vulnerabilities
 - Include a risk-based assessment of vulnerabilities
 - Consider probability and likelihood
 - Develop proposed resilience solutions
 - Schedule and prioritize resilience improvements

Task #2: State and Local Plan Review

Relevant Codes, Standards, and Regulatory Framework

- Promoting Resilient Operations for Transformative, Efficient, and Cost Saving Transportation (PROTECT) Formula Program Implementation Guidance
- New Mexico's Climate Strategy
- New Mexico's Energy Transition Act

FHWA Guidance and Tools

- FHWA Vulnerability Assessment and Adaptation Framework (2017) (VAAF)
- FHWA Assessing Criticality in Transportation Adaptation Planning

New Mexico Plans, such as:

- NMDOT LRTP
- NMDOT TAMP
- NMDOT Culvert Study
- New Mexico Climate Strategy
- New Mexico State Hazard Mitigation Plan Update

New Mexico MPO Plans

Tribal Resilience Plans and Studies

Plans from Other States and MPOs

Interactive Climate and Disaster Risk Data Tools

Task #2: State and Local Plan Review

Assets



Assets are the various elements of transportation infrastructure included in the resilience plan.

- **Findings:** The decision about which assets to include is highly dependent on a given agency's needs and datasets.
- **Recommendations:** Assets included in the RIP will be limited to NMDOT-owned **roads, bridges, and culverts**. These assets serve multiple modes, including passenger automotive, truck freight, transit, and active (i.e., pedestrian and bicycle) transportation.

Task #2: State and Local Plan Review



Vulnerability

Vulnerability refers to the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change or extreme weather events. It is primarily based on a transportation system's **exposure** to certain hazards, and may also consider the asset's **sensitivity** to climate effects .

- **Findings:** 18 hazards appeared during our hazard-related plan and tool review
 - Air quality, avalanches, cultural continuity, dam failures, droughts, dust storms, earthquakes, extreme heat, floods, food scarcity, habitat degradation/biodiversity loss, hurricanes, land movement, severe storms, tornadoes, volcanoes, water quality, wildfire, winter storms.
- **Recommendations:** Hazards included in the RIP will be limited to wildfires, flooding, drought, extreme heat, dust storms, and land movement (focusing on rockfall and debris flow).

Task #2: State and Local Plan Review

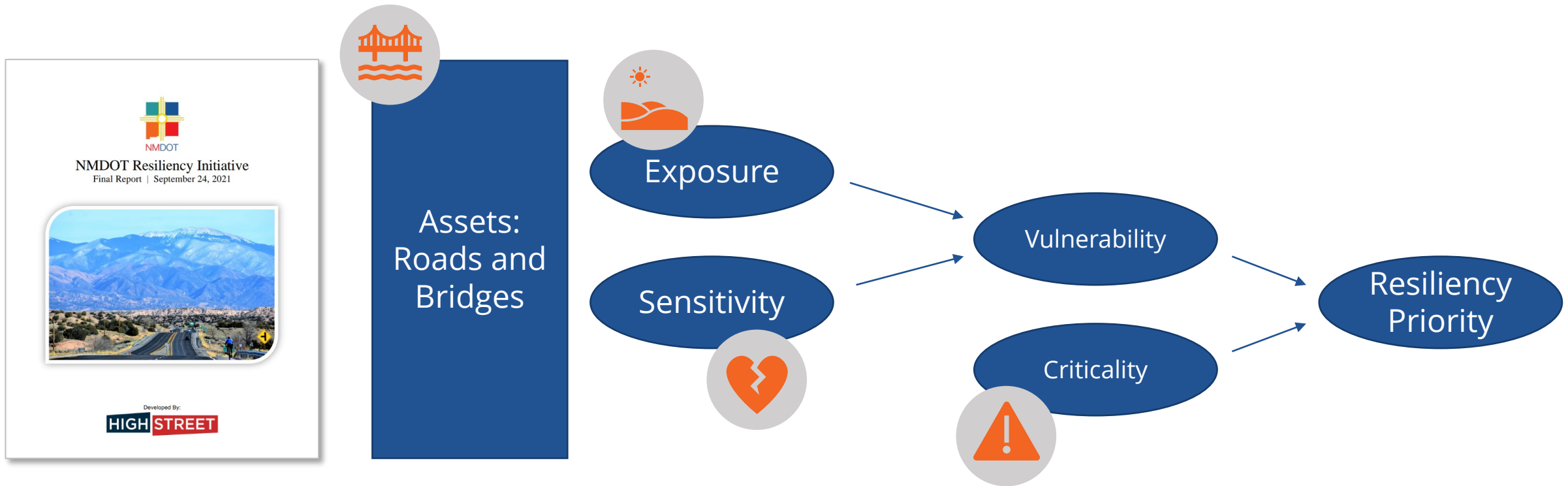
Criticality



Criticality is a lens for screening the importance of vulnerable assets in a particular geographic area to create a prioritized list.

- **Findings:** Criticality criteria generally fell into four categories (1) economic, (2) operational (e.g., level of use of an asset), (3) health and safety, and (4) social and equity.
- **Recommendations:** The RIP should include criticality criteria from each of the four categories.
 - **Economic** (tourism)
 - **Operational** (AADT, redundancy, freight significance, transit service, bike/pedestrian infrastructure)
 - **Health and safety** (role in evacuation, natural disaster, or other emergencies)
 - **Social and equity** (social vulnerability score)

Task #3: Data Update and Assessment



Task #3: Data Update and Assessment

Assets



State-owned road

Included

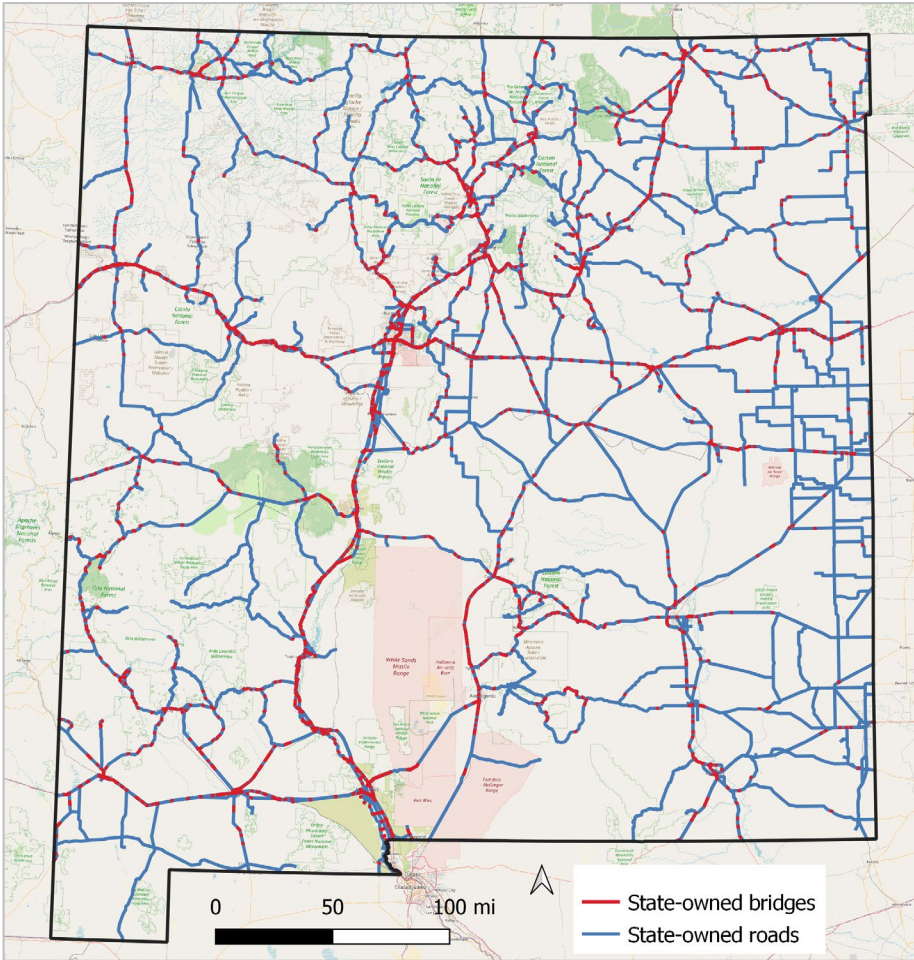
State-owned bridges and culverts over 20'

Included

Culverts 20' or less in length

Data in collection

State-owned Roads and Bridges



Task #3: Data Update and Assessment

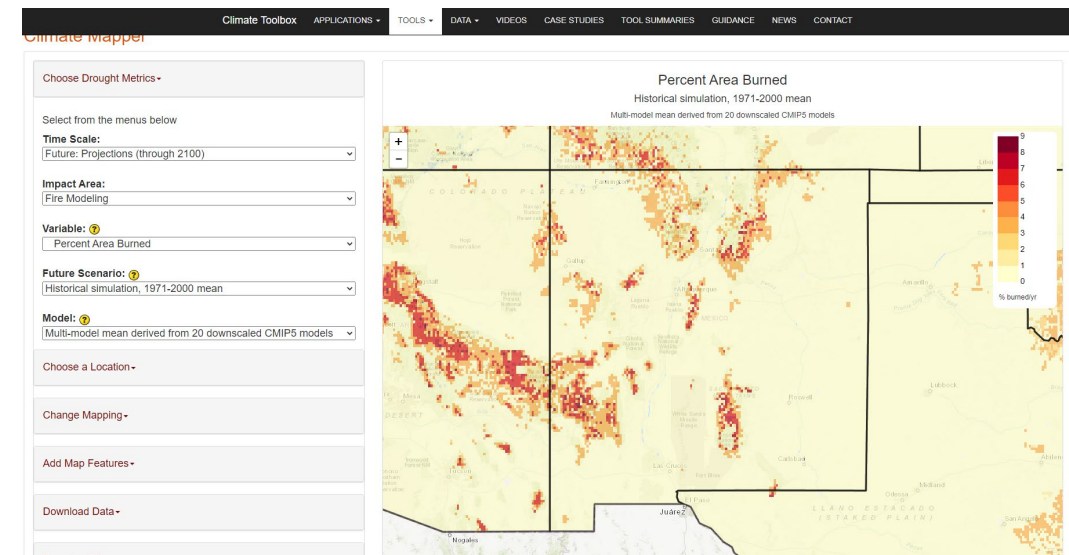
Exposure



Data Sources for Current Exposure

Hazard Criteria	Data Name	Publishing Organization	Difference from 2021 Resiliency Initiative
Wildfires	Wildfire Hazard Potential	U.S. Forest Service	No change
Rockfall	Statewide Rockfall Database	Not identified in 2021 resiliency report.	No change
Flooding	National Flood Hazard Layer	FEMA	Update
Drought	U.S. Drought Monitor	National Drought Mitigation Center	New
Dust storms	Dust-related crashes	NMDOT	New
Debris flow	<i>Forest Action Plan</i>	EMNRD*	Under consideration

Future Exposure – Climate Mapper



*EMNRD: Energy, Minerals, and Natural Resources Department

Task #3: Data Update and Assessment

Sensitivity



Data Sources for Sensitivity

Sensitivity Criteria	Data Name	Publishing Organization	Difference from 2021 Resiliency Initiative
Average pavement / overall condition	NMDOT's Pavement Mgmt. System	NMDOT	Update
Asset condition (bridge)	Bridge Condition Data	NMDOT	Update
Asset condition (culverts 20' or less)	Culvert inventory	NMDOT	To be added in the future

Task #3: Data Update and Assessment

Criticality



Data Sources for Criticality

Criteria	Measure Name	Data Name	Publishing Organization
Economic: Tourism	Share of tourism jobs / tract	LODES	U.S. Census Bureau
Health and Safety: Proximity to Hospitals	Proximity to hospitals	Homeland Infrastructure Foundation-Level Data (HIFLD)	Department of Homeland Security
Operational: AADT	AADT	Traffic sections	NMDOT
Operational: Freight Significance	% AADT from trucks	Traffic sections	NMDOT
		Freight network	NMDOT
Operational: Redundancy	Detour length	Bridge asset data	NMDOT
Operational: Transit Service	Bus route	National Transit Map Routes	U.S. DOT
		TransitFeeds	Open Mobility Data
		Transitland Operators	Transitland
Operational: Active Transportation	Pedestrian and bike activity	Bike and pedestrian volume	Replica
Social and Equity: Social Vulnerability Score	NM Equity Index	Derived from U.S. Census Bureau	Calculated based on U.S. Census Bureau data

Task #3: Data Update and Assessment

Scoring of Resiliency Priority

Scoring

Rating	Exposure	Sensitivity	Criticality
High	75 to 100 percent	75 to 100 percent	75 to 100 percent
Medium	50 to 74.9 percent	50 to 74.9 percent	50 to 74.9 percent
Low	0 to 49.9 percent	0 to 49.9 percent	0 to 49.9 percent

- **D:** Very high priority
- **C:** High priority
- **B:** Medium priority
- **A:** Low priority

Resiliency Priority – Low Criticality

Exposure	Sensitivity		
	Low	Medium	High
High	A	B	B
Medium	A	A	B
Low	A	A	B

Resiliency Priority – Medium Criticality

Exposure	Sensitivity		
	Low	Medium	High
High	B	B	C
Medium	A	B	C
Low	A	A	B

Resiliency Priority – High Criticality

Exposure	Sensitivity		
	Low	Medium	High
High	C	C	D
Medium	B	C	D
Low	B	B	C

Next Steps



Vulnerability and Criticality Assessments

Vulnerability assessment based on current and future exposure to hazards and sensitivity of assets;
Criticality assessment based on impacts of failure



Investment Plan

ID resiliency hot spots; ID possible PROTECT projects;
Prioritize projects



2045 Resilience Improvement Plan

Combine prior work into comprehensive Resilience Improvement Plan

Questions and Discussion

Thank you

DAMON FORDHAM

High Street Consulting Group

Office: 240.252.5111 x133 | Cell: 703.282.2642

fordham@highstreetconsulting.com

www.highstreetconsulting.com