FY 22 HMA – Grant Application Review Summary

Subapplication Number	EMA-2022-BR-001-0020		
Project Title	Patterson Street and East Prospect Avenue Storm Drainage Improvements		
Applicant Name	North Carolina Department of Public Safety		
Subapplicant Name	City of Raeford		
Project Type	Flood Risk Reduction		
Recommendation	Yes with Conditions		
Federal Cost (FEMA GO)	$999,370	**Phased Project**	No
BCR (subapplication)	1.17	**Duplicate Project**	No
BCR (reanalysis)	1.45	**Benefits (reanalysis)**	$2,050,677

Summary

This is a technical feasibility and cost-effectiveness review in support of the National Technical Review process. Additional Environmental Planning and Historic Preservation (EHP), eligibility and completeness, and funding limitation considerations may affect the selection of this subapplication for further consideration and funding. No contact was made with the applicant or subapplicant; this review is solely based on information provided in the subapplication.

Scope of Work

The scope of work is well-defined and clearly explains the activities necessary to complete the work. The subapplicant has submitted a subapplication for the replacement of the existing, undersized culverts at the East Prospect Avenue and Patterson Street road crossings over Peddlers Branch. The project includes the installation of double-reinforced-concrete box culverts at each of the two crossings and the replacement of approximately 350 linear feet of concrete lining in an adjacent ditch with grass. The existing culverts are frequently overwhelmed, resulting in overtopping of the road crossings. The proposed project is intended to reduce the risk of flood damage to the roadways and prevent loss of function of the crossings during storm events.

Technical Feasibility

Project Schedule

The schedule duration is 36 months. The schedule includes all items in the scope of work and is reasonable.

Cost Estimate

The cost estimate does not include sufficient line items consistent with the scope of work. Costs associated with surveying, engineering design, construction documents, and permitting do not appear to be included in the cost estimate. The cost estimate includes grant management costs as a line item in addition to 5-percent management costs. The subapplication references inconsistent contingency costs of 5 and 25 percent; it is unclear which contingency was applied to the cost estimate. Twenty five percent is greater than the contingency cost range (1–5 percent; up to 7 percent for historical structures) recommended by the HMA Guidance.

Technical Design Information

The following information and documentation were provided to support the project:

Item	Documentation	Evaluation
Proposed Level of Protection	H&H Analysis, Scope of Work Narrative	The project proposes to protect the road crossings during the 25-year event. The proposed level of protection is supported by an H&H analysis, which states that the proposed culvert replacements will provide approximately 1 foot of freeboard to the roadway during a 25-year storm event.
Flood Risk Data	FEMA FIRM, H&H Analysis	The proposed project is in the Special Flood Hazard Area. The provided documentation does show how the proposed project will reduce risk. An H&H analysis was provided to demonstrate an improvement of capacity of the culverts and, thus, a reduction in flood risk.
Residual Risk	H&H Analysis	The subapplication indicates that overtopping of the roadways may occur if an event larger than the proposed level of protection occurs.
Design and Performance Standards	H&H Analysis, subapplication narrative	The subapplication states that the culverts were sized using North Carolina Department of Transportation (NCDOT) design criteria and culvert capacity was evaluated using the USDOT Federal Highway Administration design guidance.
Design Drawings, Maps, Photographs	Conceptual drawings, project maps/photos	Documentation was provided to support the project. The design is supported by an H&H analysis, which includes a conceptual plan view drawing of the culvert replacements.
Upstream and Downstream Impacts	H&H Analysis	The documentation indicates the proposed project will not have adverse upstream or downstream impacts.
CLOMR/LOMR	No documentation provided	The documentation does not indicate if a CLOMR/LOMR is necessary.

Based on the documentation provided, the project is technically feasible and effective at reducing risk to individuals and property from natural hazards. The following conditions were identified:

- Verify that the cost estimate reflects the full cost to implement the project.
- Projects that affect the hydrologic or hydraulic characteristics of a flooding source may require a Conditional Letter of Map Revision (CLOMR) and/or a Letter of Map Revision (LOMR) if they result in changes to the existing regulatory floodway, the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA).

Cost-Effectiveness

The Benefit-Cost Analysis (BCA) was completed based on historical damages.

The following was found during review of the submitted BCA:

Cost Estimation

Input	Value	Evaluation
Project Useful Life (PUL)	100 years	This value is not consistent with the FEMA standard value. The subapplication supports this value stating this is the life expectancy of reinforced concrete pipes in the U.S. Army Corps of Engineers design guidance; however, this value exceeds acceptable limits for PUL for a culvert project.
BCA Toolkit Initial Project Cost	$1,360,000	This amount is not consistent with the subapplication project cost estimate; the amount input in the BCA represents the project cost rounded up to the nearest ten-thousandth.
Annual Maintenance Cost	$3,000	This amount is reasonable.
BCA Toolkit Total Project Cost	$1,402,808	This amount is calculated based on the initial project cost, the annual maintenance costs, and the PUL.

Historical Damages

Input	Evaluation
Facility Type	The facility type of roadway closures was used in the BCA. This input is consistent with the proposed project in the subapplication. The inputs only reflect loss of function of and damages to the East Prospect Avenue crossing; the Patterson Street crossing is not considered in the BCA.
Loss of Function	The input of 3,168 detour trips per day is supported by NCDOT traffic counts. A map was provided showing a 0.08-mile detour that assumes both crossings are closed; however, the mapped route only represents a portion of the detour around both crossings. The BCA report states that the estimated detour time of 1.06 minutes considers traffic volumes, traffic signals, and speed limits; however, supporting documentation was not provided.
Before-Mitigation Damages	Before-mitigation damages are based on roadway repairs at the East Prospect Avenue crossing after the road was overtopped during Hurricane Matthew in 2016. While invoices provided support damages of $5,610 for engineering design and $53,000 for construction, the BCA inputs appear to double count the design fees for a total of $64,220 in before-mitigation damages. The construction invoice provided a work completion date to support the days of impact; however, the duration of 67 days between the beginning of the 2016 event on October 8 and the work completion date of December 14 is not consistent with the BCA input of 73 impact days. The subapplication states that a recurrence interval (RI) of 2 years was used for the 2016 event because the culvert is overwhelmed during storms

Input	Evaluation
	larger than a 2-year event. When using historical damages, RIs should be estimated based on available data.
After-Mitigation Damages	The BCA assumes an after-mitigation loss of function of 1 day and $3,000 in damages, which represents the maintenance cost after a 25-year event. Since the proposed culverts provide approximately 1 foot of freeboard during the 25-year event, which is a reasonable and conservative estimate.

Additional Benefits

Input	Documentation	Evaluation
Environmental Benefits	Map showing project area	The project used 2,702 square feet of riparian area, based on the amount of existing riparian area within the proposed limits of work. The percentage of land use of the project area is not consistent with the project description and supporting documentation. Environmental benefits are not applicable as it does not appear the land use type is being enhanced or created. Environmental benefits for upgrading the concrete-lined ditch to grass-lined ditch were not included.

Reanalysis BCA

A reanalysis BCA was performed, and the following edits were made:

Input	Value	Explanation
PUL	30 years	This value is consistent with FEMA standard values for culverts.
Initial Project Cost	$1,359,688	The initial project cost was updated for consistency with the cost estimate in the subapplication.
Loss of Function	Detour consisting of 6 minutes of additional time and 2.5 additional miles	These values are based on online mapping estimates of the additional time and mileage to cross Peddlers Branch when both the East Prospect Avenue and Patterson Street crossings are closed.
Before-Mitigation Damages	$58,610 in damages, 67 impact days, and RI of 10 years	The damages were updated to match the documentation provided. An RI of 10 years was estimated for Hurricane Matthew in Raeford based on National Weather Service observed 24-hour totals for Hurricane Matthew and National Oceanic and Atmospheric Administration Atlas 14 Point Precipitation Frequency Estimates.

Input	Value	Explanation
After-Mitigation Damages	No impact days or damages during the 25-year event, 67 impact days and $58,610 in damages during the 100-year event.	Since the project proposes approximately 1 foot of freeboard during the 25-year event, no impact days or damages were added for the 25-year RI event. An additional event with an RI of 100 years was added with the same amount of impact days and damages as the before-mitigation 2016 event. This is a conservative estimation of after-mitigation damages.
Environmental Benefits	0 square feet	Environmental benefits were removed from the BCA for a conservative analysis.

The subapplication qualified for the Alternative Cost-Effectiveness Methodology, as noted in the "Alternative Cost-Effectiveness Methodology for Fiscal Year 2022 BRIC and FMA Application Cycle" Memorandum; this methodology was used in the reanalysis BCA. The project primarily benefits an area at the census tract level with a Social Vulnerability Index (SVI) score greater than or equal to 0.6, based on Centers for Disease Control and Prevention (CDC) data.

The BCR generated at the 7% discount rate was 0.93, and the BCR generated at the 3% discount rate was 1.45. The total benefits associated with this project (at a 3% discount rate), $2,050,677, are greater than the total project cost of $1,418,489, producing a BCR of 1.45.

Based on the documentation provided, the project is cost-effective.

Conclusion

Based on the information provided, the project is technically feasible and cost-effective; therefore, it is recommended for further consideration with the following conditions:

- Verify that the cost estimate reflects the full cost to implement the project.
- Projects that affect the hydrologic or hydraulic characteristics of a flooding source may require a Conditional Letter of Map Revision (CLOMR) and/or a Letter of Map Revision (LOMR) if they result in changes to the existing regulatory floodway, the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA).

This review is an evaluation of the project's technical feasibility and cost-effectiveness. Additional EHP, eligibility and completeness, and funding limitation considerations may affect the selection of this subapplication for further consideration and funding.