

Conditional Letter of Map Revision (CLOMR)

City of Martin Redevelopment, Phase II

**Beaver Creek
Floyd County, KY**

September 27, 2019

Conditional Letter of Map Revision (CLOMR)

City of Martin Redevelopment, Phase II

Prepared for:
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1 Introduction

The City of Martin is situated in the geographic center of Floyd County in Eastern Kentucky. The city was developed along the banks of Beaver Creek, a tributary of the Levisa Fork of the Big Sandy River, and is approximately 5 miles upstream from the confluence of Beaver Creek with Levisa Fork. The total upstream drainage area encompasses approximately 240.2 square miles of mountainous terrain.

As a direct result of the April 1977 flood, the United States Army Corps of Engineers (USACE) created the Town of Martin Nonstructural Project to facilitate nonstructural flood damage reduction measures. According to Geological Survey Professional Paper 1098: Flood of April 1977 in the Appalachian Region of Kentucky, Tennessee, Virginia, and West Virginia, prepared jointly by the U.S. Geological Survey and the National Oceanic and Atmospheric Administration, the flood of April 1977 caused 22 deaths and more than \$400 million in damages. The Energy and Water Development Appropriations Act of 1981 (Public Law 96-367) authorized the development of flood protection measures for the Levisa and Tug Forks of the Big Sandy River. At Federal expense, the Secretary of the Army, through the Chief of Engineers, is directed to design and construct flood damage reduction measures in areas that were impacted by flood, specifically the flood of April 1977. The flood of May 1984 spurred Public Law 98-332, which authorized funding to this end.

This report summarizes a proposed project that is part of Phase II of the Town of Martin Nonstructural Redevelopment Project along Beaver Creek. The proposed project is located on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel 21071C0184E, effective September 16, 2015. The location of this project is shown in Figure 1 and the effective FIRM is included as Appendix A.

As shown on the current effective map, the redevelopment areas are within the Special Flood Hazard Area. To provide developable land above the Base Flood Elevation (BFE), or 100-year flood elevation, a portion will be raised by placing fill from approximately 1,460 feet downstream of State Highway 3190 to approximately 90 feet upstream of the confluence of Buck Branch along Beaver Creek. Grading plans for the proposed fill are provided in Appendix B.

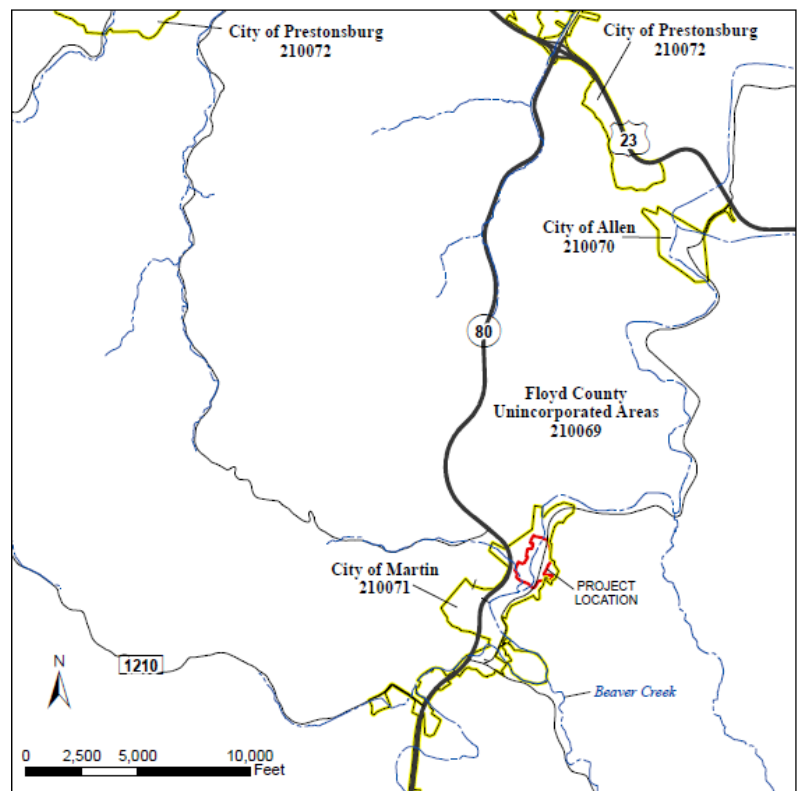


Figure 1: Approximate CLOMR location

Current plans are to elevate the roadway in its existing horizontal location. During construction, a detour to connect KY-1428 to the proposed Phase II site will be created and is anticipated to be incorporated as an additional street upon completion of construction. Additional construction includes an approximately 530-foot precast box culvert to extend through the proposed fill, below the detour and relocated KY-1428, to a rock-lined channel to convey the drainage to Beaver

Creek. Properties within the downtown area that will be affected by the placement of fill will be acquired and demolished. Once these areas have been acquired, the bridge on Water Street, which crosses Beaver Creek, will be removed, including abutments and piers.

The purpose of this report is to present the data required to support a Conditional Letter of Map Revision (CLOMR) request by USACE, on behalf of the City of Martin, Kentucky. The new study contains a hydraulic analysis, which was used to map the floodway and 100-year and 500-year floodplains for existing and proposed conditions. The applicable MT-2 application forms related to the CLOMR are provided in Appendix C.

2 Hydraulic Analyses

2.1 Effective Analyses

The current effective Flood Insurance Flood Study (FIS) for Beaver Creek is part of the Floyd County, Kentucky, FIS dated September 16, 2015. Beaver Creek was studied in 2004 under Contract No. DACW69-03-D-0025 as part of the Levisa Fork Tributaries Flood Study in Floyd County, Kentucky, for USACE, Huntington District. The 7.2 miles of streamline, extending from the confluence with Levisa Fork (downstream limit) to the confluence of Left Fork Beaver Creek and Right Fork Beaver Creek (upstream limit), was studied using detailed methods. The Hydrologic Engineering Center – River Analysis System (HEC-RAS) computer program, developed by USACE, was used to perform the one-dimensional, steady flow hydraulic analysis. The 2-, 5-, 10-, 25-, 50-, 100-, and 500-year annual chance storms were studied, as well as the April 1977 storm for calibration. Cross sections were developed using the ArcGIS extension tool, HEC-GeoRAS, from a blend of survey and Triangulated Irregular Network (TIN) information. The initial cross section geometry was in dual units (where the horizontal was in meters and the vertical elevations was in feet) and modified to convert all horizontal units from meters to feet. This was the USACE model FEMA used to create the effective hydraulic model that is the basis of the 2015 FIS for Beaver Creek. As shown on the FIRM Panel 21071C0184E, provided in Appendix C, Beaver Creek is designated as Zone AE with a floodway.

2.2 Existing Conditions Analyses

Pre-construction conditions (existing conditions) were analyzed by updating the study area within the effective HEC-RAS model with new topographic and landcover data. The 10-, 50-, 100-, and 500- year annual chance storm events were studied. The study area is approximately 0.45 mile along Beaver Creek within the City of Martin. The upstream limit of the study is approximately 140 feet downstream of The New Bridge at Cross Section 3,1257.01 from the HEC-RAS model and the downstream limit is approximately 2,510 feet downstream of The New Bridge at Cross Section 2,8889.76.

Updated topographic data was obtained from the Kentucky Geography Network website, KyGeoNet. The most recent topographic data within Floyd County was 5-foot Digital Elevation Model (DEM) tiles. Four 1 square mile tiles (N123E402, N123E403, N124E402, and N124E403) were downloaded and mosaicked together in ArcGIS. Overbank cross section geometry for Cross Sections 3,1257.01 through 2,8889.76 were updated using HEC-GeoRAS. Channel geometry was kept the same as effective since it was based on survey data. Ineffective areas were modified from the effective model based on updates to the terrain and engineering judgment.

Manning's roughness coefficients (n values) for the right overbank were re-evaluated and updated based on current aerial images. Manning's n values for existing conditions are shown in Table 1.

Table 1: Existing Conditions Manning's N Values

Land Use Type	Manning s N
Channel	0.050
Residential	0.080
Open Green Space	0.035
Forest	0.100
Roadway	0.025

Optimization for the existing conditions floodway was attempted by adjusting the location of the encroachments within the project area. The purpose was to evaluate whether the proposed project extents could be removed from the existing conditions floodway. This effort was not successful, as surcharges in several locations exceed the 1-foot FEMA-regulated threshold.

2.3 Proposed Conditions Analyses

A proposed conditions hydraulic model was developed to reflect Phase II of the Town of Martin Redevelopment project. The proposed project consists of relocating portions of the downtown area, raising the downtown elevation to above the 100-year flood elevation (1% annual chance flood), and redeveloping on the raised surface. The existing conditions model was modified to reflect proposed project conditions.

The following revisions have been made to the existing conditions HEC-RAS model to produce the proposed conditions model:

- Removed Water Street Bridge at Cross Section 3,0402.53 (identified as “BBV04 - Concrete Bridge” in the model).
- Incorporated the proposed graded fill and access road into the existing conditions topography.
- Modified the Manning's n values to incorporate proposed changes to the landscape, including changing select residential areas to open green space and adding appropriate Manning's n values for the proposed access road and new road. Specific values used are shown in Table 2.

Table 2: Proposed Conditions Manning's N Values

Land Use Type	Manning's N
Channel	0.050
Residential	0.080
Open Green Space	0.035
Forest	0.100
Roadway	0.025
Proposed Roadway Slopes	0.045

3 Results

The effective, existing, and proposed conditions HEC-RAS models are provided in digital format in Appendix D. Resulting 100-year and 500-year floodplains and floodway shapefiles for the three conditions are provided in Appendix E. Work maps incorporating the updated results are shown in Appendix F. Comparison of the BFEs within the study area between the effective, existing, and proposed conditions is shown in Table 3.

Table 3: BFE Comparisons between the Effective, Existing, and Proposed Conditions

Stationing	Effective BFE (ft)	Existing BFE (ft)	Proposed BFE (ft)	Proposed BFE Effective BFE (ft)	Proposed BFE Existing BFE (ft)
3,1257.01 (proposed u/s tie-in)	658.56	658.46	658.39	-0.17	-0.07
3,1038.95	658.55	658.45	658.36	-0.19	-0.09
3,0815.49	658.53	658.43	658.31	-0.22	-0.12
3,0612.48 (XS T)	658.45	658.36	658.24	-0.21	-0.12
3,0415.53	658.43	658.32	658.17	-0.26	-0.15
3,0402.53	Water Street Bridge		Water Street Bridge Removed	Water Street Bridge Removed	Water Street Bridge Removed
3,0361.2	658.25	658.20	658.13	-0.12	-0.07
3,0182.35	658.13	658.10	658.06	-0.07	-0.04
2,9847.6	657.92	657.89	657.84	-0.08	-0.05
2,9529.95 (XS S)	657.64	657.69	657.57	-0.07	-0.12
2,9199.31	657.46	657.55	657.50	0.04	-0.05
2,8889.76 (proposed d/s tie-in)	657.12	657.10	657.02	-0.1	-0.08

¹ BFE – Base Flood Elevation; d/s = downstream; ft = feet; u/s = upstream; XS = cross section

Proposed condition BFEs are lower than existing condition BFEs with a range of 0.04 to 0.15 foot, indicating that the project will result in no rise of the BFE. This is consistent between the proposed conditions and effective with an exception at cross section 2,9199.31, where the proposed conditions BFE is 0.04 foot higher. The higher BFE is likely attributed to updated Manning's n values, which are higher in some locations, and the implementation of more recent overbank topography.

4 Endangered Species Act Compliance

TBD

5 Summary

As part of the Phase II Nonstructural Redevelopment project within the City of Martin, Kentucky, effective, existing, and proposed condition hydraulic models were analyzed to determine the impact of the proposed project on the effective BFEs and floodway. Utilizing the effective hydraulic model, updates were made to cross sections 3,1257.01 to 2,8889.76 in order to create existing and proposed condition HEC-RAS models. As indicated in Table 3, the proposed conditions are expected to result in no rise in BFE compared to existing conditions. The resultant updated FIRM, which incorporates proposed condition 100-year floodplain, 500-year floodplain, and floodway, is provided in Appendix F, and the annotated FIRM is shown in Appendix G. The draft legal notification to the community is provided in Appendix H.

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