DEPARTMENT OF NATURAL RESOURCES

MEMORANDUM

To: Kevin Stauffer, Area Fisheries Supervisor, DNR
Jeff Weiss, P.E., CFM, Floodplain Program, LUP-EWR-DNR
Kevin Zytkovicz, River Ecology Unit, EWR-DNR

From: Salam Murtada, P.E., PH, CFM
DNR- EWR, Floodplain Program

Date: November 8, 2021

Subject: Floodplain Analysis for Gorman Creek restoration

The DNR-EWR Floodplain Mapping Program conducted a floodplain analysis to determine the effects of a proposed restoration on the base flood elevations (BFE) for an approximate study area. The stream restoration project is located in the upper part of Gorman Creek subwatershed, east of the City of Kellogg, Wabasha County (Figure 1).

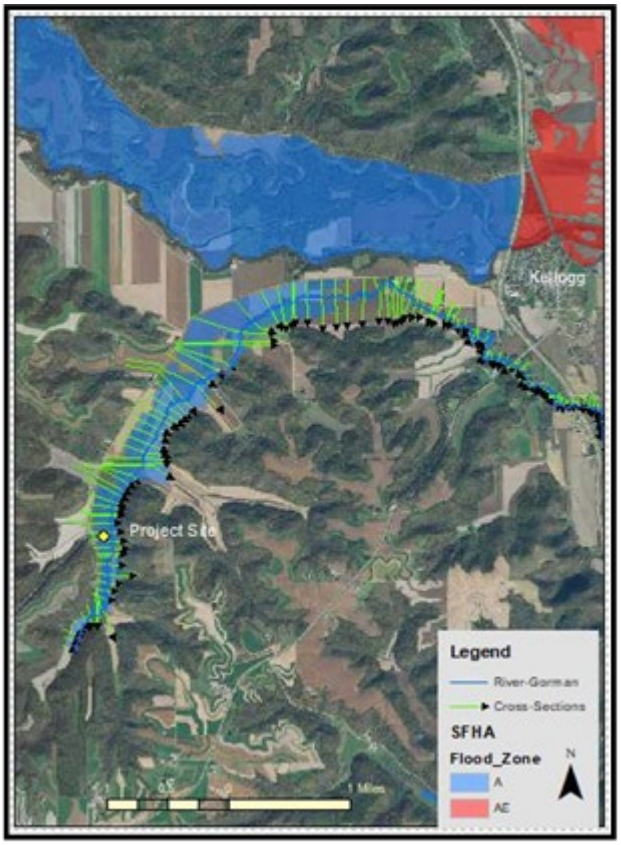

Figure 1: Project location showing the cross-section lines of HEC-RAS m

The stream restoration project involves restoring an approximately 1400-ft of existing straightened channel and 900-ft of its tributary. (Figure 2).

FEMA Special Flood Hazard Area (SFHA):

The project is located in an approximate study area (Zone A). To achieve no-rise limits, the project should have 0.00-ft impact (no increase or decrease) on the BFEs. Furthermore, if the cumulative rise is above 0.5-ft, then a Conditional Letter of Map Revision (CLOMR) is required, followed by a Letter of Map revision (LOMR) to be submitted within six months of project completion. Please note that the local floodplain administrator representing the NFIP Community should be reviewing and approving the floodplain analysis (Kevin Krause, 651-565-3062, kkrause@co.wabasha.mn.us).

Data and Information:

The floodplain analysis required the following information:

- Survey of affected existing channel: (Kevin Zytkovicz, River Ecology Unit, EWR-DNR)
- Survey of proposed stream design (Wabasha SWCD and Kevin Zytkovicz, REU, EWR-DNR)
- New channel alignment (Wabasha SWCD and Kevin Zytkovicz, REU, EWR-DNR)
- HEC-RAS model: Gorman Creek effective model (2014)
- MN Geospatial Commons (2013): Quick layers for 1-meter LiDAR DEM, aerials, FEMA maps, etc.

Hydraulic Analysis:

The effective HEC-RAS model for Gorman Creek (2014) was used to simulate the proposed conditions and compare with existing conditions. Since the model was originally developed using HEC-GeoRAS, flowpath data could not be re-recreated in RAS Mapper. As a result, all changes where done directly in the model and outside of RAS Mapper in separate plans and geometry files.

The modeling was conducted as follows:

- In a new geometry representing the existing condition, three cross-sections within the proposed restoration reach were adjusted to match the proposed alignment (RS 12333.8, RS 12234.5 and RS 12119.7)
- A new cross-section (RS 12177) was added between RS 12119.7 and RS 12234.5 to make the spacing more consistent.
- Since bathymetry did not appear to be captured in the effective model, recent existing survey data was incorporated into the model reach proposed for restoration.
- Proposed geometry was created based on the restoration plans and new alignment. Mannings n-values of 0.035 was used for the channel and 0.05-0.06 for the floodplain to represent the proposed vegetation consisting of native prairie and meadow grass (Table 3-1, Chapter 3, HEC-RAS 5.0 Reference Manual).

Results:

According to the modeling results, the restoration project causes an increase of up to 0.06-ft (RS 12177). Due to the increase, the floodplain analysis does not meet the no-rise conditions. However, since the project is located in an approximate study area, a Letter of Map Change (LOMR) is not required. Furthermore, since the increase is less than the allowable cumulative increase of 0.5-ft for approximate study areas, CLOMR is not required. Please note that the proposed base flood elevations (BFE) can become the new best available after the as-builts are incorporated into the effective model.

Table 1: Summary of results

HEC-RAS River: Gorman Creek Reach: Main Profile: PF 1

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	12430.61			Culvert									
Main	12416.32	PF 1	Existing	4790.00	795.70	803.02	803.02	803.20	0.001227	5.37	1928.49	893.85	0.36
Main	12416.32	PF 1	Proposed	4790.00	795.70	803.02	803.02	803.20	0.001227	5.37	1928.49	893.85	0.36
Main	12333.83	PF 1	Existing	4790.00	794.55	800.90		801.10	0.003411	6.11	1586.69	827.30	0.52
Main	12333.83	PF 1	Proposed	4790.00	795.10	800.65		800.83	0.002142	4.48	1714.83	816.47	0.42
Main	12234.5	PF 1	Existing	4790.00	793.38	800.07	799.18	800.22	0.002986	5.55	1794.98	991.99	0.48
Main	12234.5	PF 1	Proposed	4790.00	794.80	800.12	798.80	800.23	0.001255	3.64	2226.43	1097.77	0.33
Main	12177	PF 1	Existing	4790.00	792.09	799.46		799.60	0.002292	5.27	2020.17	1071.81	0.44
Main	12177	PF 1	Proposed	4790.00	794.50	799.52		799.65	0.001706	3.98	2125.10	1085.83	0.38
Main	12119.7	PF 1	Existing	4790.00	792.06	798.99	798.17	799.11	0.002348	5.44	2070.38	1065.58	0.44
Main	12119.7	PF 1	Proposed	4790.00	794.20	798.94	798.08	799.08	0.001729	3.77	1993.68	1050.96	0.37
Main	11997.55	PF 1	Existing	4790.00	791.80	797.75	797.31	797.95	0.004556	7.30	1799.43	1036.41	0.61
Main	11997.55	PF 1	Proposed	4790.00	791.80	797.75	797.31	797.95	0.004556	7.30	1799.43	1036.41	0.61
Main	11888.86	PF 1	Existing	4790.00	788.94	796.24	795.86	796.45	0.004086	7.33	1918.29	1135.34	0.58
Main	11888.86	PF 1	Proposed	4790.00	788.94	796.24	795.86	796.45	0.004086	7.33	1918.29	1135.34	0.58
Main	11882.13			Culvert									

Restoration

As a result, we recommend approval by the Wabasha County floodplain administrator who will be reviewing and approving the project.

Please let me know if you have any questions or need further information.

CC: Kevin Krause, Floodplain Administrator for Wabasha County
Pete Fryer P.E., Wabasha Soil and Water Conservation District
Lucas Youngsma, CFM, DNR Area Hydrologist