

DEPARTMENT OF HOMELAND SECURITY
 Federal Emergency Management Agency
RIVERINE HYDROLOGY & HYDRAULICS FORM (FORM 2)

OMB Control Number: 1660-0016
 Expiration: 1/31/2024

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington, DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

Flooding Source: Gill Creek

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply):

- Not revised (skip to section B)
 No existing analysis
 Improved data
 Alternative methodology
 Proposed Conditions (CLOMR)
 Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
See attachment			
Table 3 and Table 4 from			
USACE Gill Creek Study			

3. Methodology for New Hydrologic Analysis (check all that apply)

- Precipitation/Runoff Model → Specify Model: _____ Duration: _____ Rainfall Amount: _____
 Statistical Analysis of Gage Records
 Regional Regression Equations
 Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review. 4. HEC-RAS File Description**:

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? Yes No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevation (ft.)	
			Effective	Proposed/Revised
Downstream Limit*	Confluence Niagara River	See attached	Tables 9 and 10 +	from USACE study
Upstream Limit*	Above City boundary		Cross Sections	

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HEC-RAS version 6.2

Steady State Unsteady State One-Dimensional Two-Dimensional

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4. HEC-RAS File Description**:

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
	see attached				
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

* For details, refer to the corresponding section of the instructions.

**See instructions for information about modeling other than HEC-RAS. Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Topographic Information: Digital Mapping (GIS/CADD) Data Submitted (preferred)

Source: Survey field data obtained by USACE and LiDAR

Date:

Vertical Datum: NAVD 1988

Spatial Projection:

Accuracy:

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) or Special Flood Hazard Areas (SFHAs) increase compared to the effective BFEs? Yes No
- If Yes, please attach **proof of property owner notification**. Examples of property owner notifications can be found in the MT-2 Form 2 Instructions.
2. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:
- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
 - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.
3. Does the request involve the placement or proposed placement of fill? Yes No
- If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.
4. Does the request involve the placement or proposed placement of fill? Yes No
- If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.
5. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

Table 3: Gill Creek parameters used in rural regional regression equation (Lumia et al., 2006) frequency flow calculations

Location on Gill Creek	Drainage Area (Sq. Mi.)	Slope Ratio	% Basin Classified as Open Water/Wetlands	Mean Annual Runoff (in.)	% of Area with Elevation 1200 ft above Sea Level
City of Niagara Falls Corporate Boundary	5.17	.1	3.80	13.5	0
DS of East Gill	8.46	0.0627	2.38	13.5	0
DS Hyde Park	9.10	0.0599	2.43	13.5	0
At Ferry Avenue	9.19	0.059	2.41	13.5	0
Confluence with Niagara River	12.27	0.0575	1.64	13.6	0

Table 4: Initial Rural Frequency flows for Gill Creek Sub-Basins using Lumia et al. (2006)

Stream locations from upstream to downstream	Peak Discharge (cfs)									
	Drainage area (sq miles)		10% Annual Chance (cfs)		2% Annual Chance (cfs)		1% Annual Chance (cfs)		0.2% Annual Chance (cfs)	
	Current Study	2002 Study	Current Study	2002 Study	Current Study	2002 Study	Current Study	2002 Study	Current Study	2002 Study
CNF Corporate Boundary	5.17	5.0	166	260	223	540	246	730	299	1250
DS of East Gill	8.45	8.3	238	450	312	880	341	1210	409	2100
DS Hyde Park Dam	9.10	9.3	248	480	325	960	355	1350	426	2330
DS of Ferry Avenue	9.19	10.5	250	530	327	1060	357	1530	428	2620
Confluence with Niagara River	12.26	12.1	329	620	429	1190	468	1490	559	2660

Table 9: Gill Creek - Floodway Data Table

Flooding Source		Floodway			Base Flood Elevation Water Surface		
Cross-section	DISTANCE ¹ (FT.)	WIDTH (FT)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (FPS)	WITHOUT FLOODWAY (NAVD88 ³)	WITH FLOODWAY (NAVD88 ²)	DIFFERENCE (FT.)
Gill Creek, Niagara County, NY							
A	29	132	199	4.1	557.5	557.5	0.0
B	356	119	261	2.2	561.2	561.2	0.0
C	3289	52	272	2.1	567.0	567.0	0.0
D	3821	75	352	1.6	567.3	567.3	0.0
E	4608	52	209	2.7	567.9	567.9	0.0
F	5706	31	201	2.7	571.0	571.0	0.0
G	6071	45	299	1.8	571.2	571.2	0.0
H	6708	59	436	1.2	571.6	571.7	0.1
I	7932	398	3,821	0.1	575.7	575.7	0.0
J	8415	339	3,285	0.1	575.7	575.7	0.0
K	9724	253	2,238	0.1	575.7	575.7	0.0
L	11200	209	1,395	0.2	575.7	575.7	0.0
M	13070	99	348	0.9	576.0	576.1	0.1
N	13843	97	333	1.0	576.1	576.4	0.3
O	14438	77	248	1.1	576.3	576.7	0.4
P	16194	77	183	1.8	576.9	577.7	0.8
Q	16999	30	115	2.8	577.4	578.1	0.7
R	17598	33	97	3.3	578.0	578.4	0.4
S	18618	31	56	5.7	579.5	579.6	0.1
T	19566	38	89	3.6	581.4	581.4	0.0
U	19819	64	170	1.9	582.6	582.5	-0.1
1 - Distance upstream of Niagara River Confluence							
2 - North American Vertical Datum of 1988 (in ft.)							
Niagara County NY		Floodway Data					
		Flooding Source: Gill Creek					

Table 10: Base Flood Elevations (BFE) Differences - Current Study vs. 2002 Study

CROSS-SECTION	DISTANCE¹ (FT.)	Current BFE (NAVD88²)	2002 BFE (NAVD88²)	DIFFERENCE (FT.)
A	29	557.5	561.2	-3.7
B	356	561.2	566.2	-5.0
C	3289	567.0	570.0	-3.0
D	3821	567.3	570.3	-3.0
E	4608	567.9	570.9	-3.0
F	5706	571.0	571.7	-0.7
G	6071	571.2	572.2	-1.0
H	6708	571.7	573.2	-1.5
I	7932	575.7	576.9	-1.2
J	8415	575.7	576.9	-1.2
K	9724	575.7	576.9	-1.2
L	11200	575.7	576.9	-1.2
M	13070	575.98	577.8	-1.82
N	13843	576.14	577.8	-1.66
O	14438	576.34	577.9	-1.56
P	16194	576.91	578.3	-1.39
Q	16999	577.41	578.8	-1.39
R	17598	577.95	579.1	-1.15
S	18618	579.07	583.9	-4.83
T	19566	581.38	584.8	-3.42
U	19819	582.60	585.0	-2.40
1 - Distance upstream of Niagara River Confluence				
2 - North American Vertical Datum of 1988				
3 - New cross-section				

Project: gillcreek3
Directory Path:
Model Datum: NAD83
Final MXD Location:

----- Select from Pulldown -----

Plan Files		Description/Purpose	Filename	Geometry File	Steady Flow	Terrain File
Final_All_Flows		Final run of the model with all applicable flow events	GillCreek_FPMS.p77	XS_Updates_Final_Geometry	FPMS_All_Flows	Terrain(1).CloneTerrain
Final_XS_Floodway_Refinement_2_Final		Final run of the model for floodway	GillCreek_FPMS.p76	XS_Updates_Final_Geometry	FPMS_Flows_Floodway	Terrain(1).CloneTerrain
Geometry Files			Description			
XS_Updates_Final_Geometry		Final geometry of the model	GillCreek_FPMS.g32			
Steady Flow Files			Description			
FPMS_All_Flows		All flows for various events	GillCreek_FPMS.f19			
FPMS_Flows_Floodway		Flows for floodway	GillCreek_FPMS.f18			
Terrain Files			Description			
Terrain(1).CloneTerrain		Final terrain with terrain modifications to correct lidar				

