FLAT CREEK

LETTER OF MAP REVISION REQUEST

Project Location: Teton County, Wyoming
Community No.: 560094
Map No.: 56039C
Panel Nos.: 2908E & 2916E

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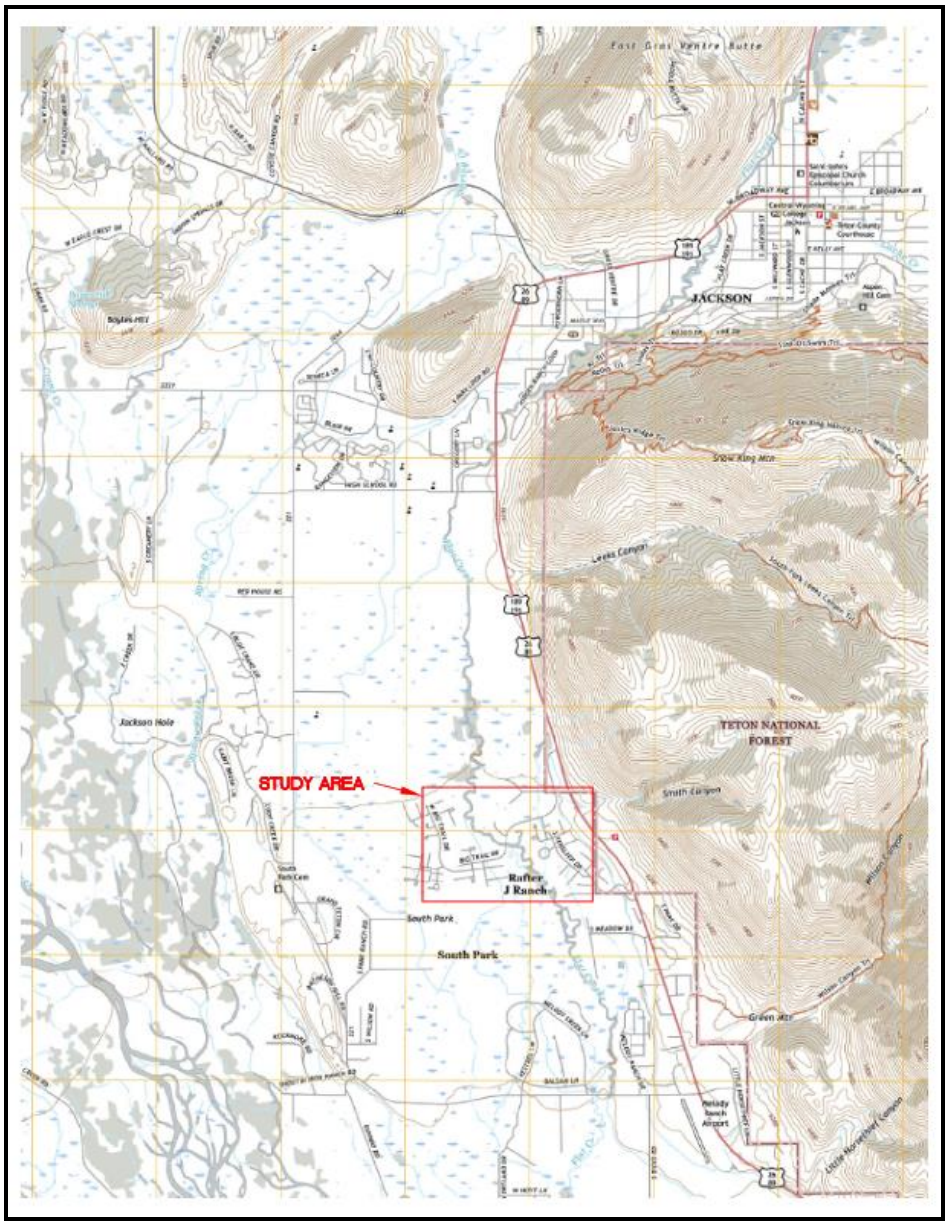
1. Introduction

1.1 Study Location

The study area (see Figure 1) is located within Rafter J Ranch Subdivision, Teton County, Wyoming, south of the Town of Jackson. Flood hazard information for the portion of Flat Creek being revised can be found on Panels 56039C2908E and 56039C2916E of the Flood Insurance Rate Map (FIRM) for Teton County, Wyoming and Incorporated Areas, dated September 16, 2015. The revised reach segment of Flat Creek begins at modeled cross section 28048 (published Cross Section X), located 26,698 feet above U.S. Highway 89 measured along the profile baseline, and extends 7,422 feet upstream to modeled cross section 35470.

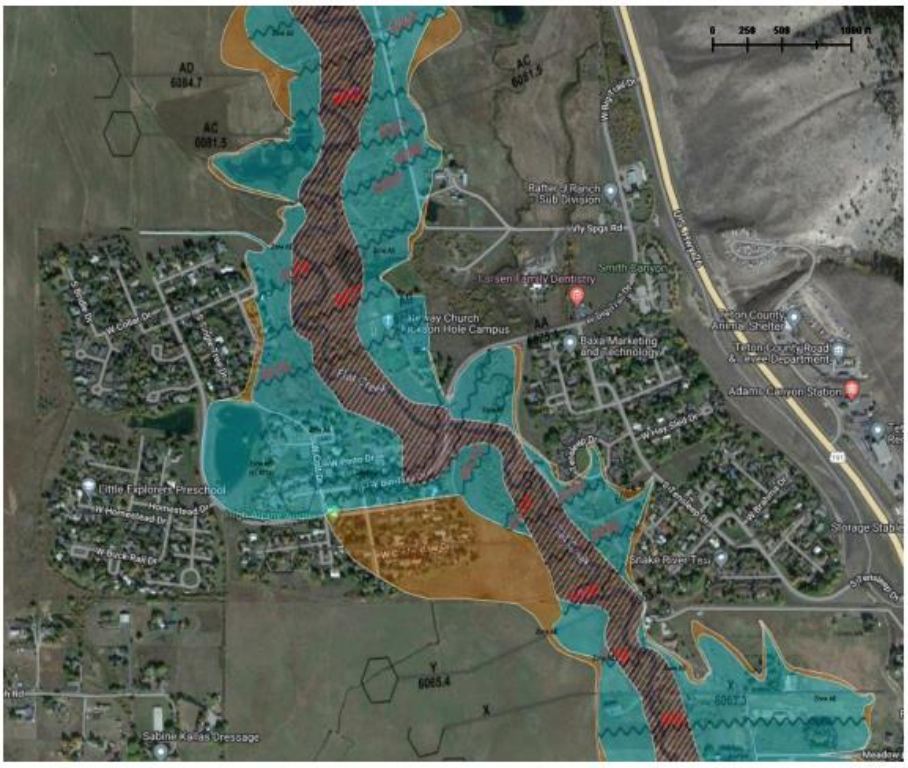
Figure 1. Flat Creek LOMR Vicinity Map



1.2 Letter of Map Revision

This Letter of Map Revision (LOMR) affects published flood hazard information on a portion of Flat Creek located within Teton County, Wyoming. It is based on updated peak discharge values for the various magnitude flood events studied that were approved in a Conditional Letter of Map Revision (Case No.: 20-08-1005R-560094), and newer/more acute topographic information. The effective flood hazard information is shown in Figure 2.

Figure 2. Flat Creek Effective Flood Hazard Information



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2. Topographic Data

High resolution LiDAR data acquired in September 2015 was obtained from the Teton County Conservation District and utilized for this study. This LiDAR has an average 4.2 points per square meter, and CORS base stations and statistically collected survey data was used for static ground control. Horizontal accuracy meets National Map Accuracy Standards at the 90% confidence level (3.33-feet or 1-meter). Validated vertical accuracy is 0.039-feet RMSEz at 95% confidence level tested in flat, non-vegetated terrain. Two-foot contours were generated from the bare-earth DEM using 1-ft cell size by Aero-graphics.

Topographic data used to define the channel geometry at the modeled cross sections is based on a detailed field survey performed by Badger Aerial Mapping and Surveying in the Fall of 2022.

The vertical datum used in the FIS and this LOMR is the North American Vertical Datum of 1988 (NAVD88) and the horizontal datum is the North American Datum of 1983 (NAD83). The 2015 LiDAR and the LOMR maps use Wyoming West State Plan coordinate system projection with units in US Survey Foot.

3. Hydrologic Analysis

Peak discharges applied to the Flat Creek study area were taken from a hydrologic study entitled, ñLower Flat Creek Peak Streamflow Studyò, prepared by WaterVation, PLLC, dated February 1, 2021. This study was approved by FEMA as a part of a Conditional Letter of Map Revision (Case No.: 20-08-1005R-560094).

Peak discharges published in the currently effective Flood Insurance Study Report for Teton County, Wyoming and Incorporated Areas, reprinted with corrections on May 15, 2020, were utilized upstream and downstream of the study area in the hydraulic analysis to tie into the effective Flood Insurance Study. In accordance with the ñSummary of Dischargesò Table in the FIS Report and the effective hydraulic analysis, peak discharge values for Flat Creek are shown in Table 1.

Table 1. Summary of Discharges

Cross Section	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
0-4334	830 cfs	1,050 cfs	1,310 cfs	1,660 cfs
5333-28048	800 cfs	1,030 cfs	1,290 cfs	1,640 cfs
28908-34540	398 cfs	519 cfs	574 cfs	692 cfs
35470-44814	800 cfs	1,030 cfs	1,290 cfs	1,640 cfs

4. Hydraulic Analysis

A hydraulic analysis was performed using the Hydrologic Engineering Center River Analysis System (HEC-RAS) computer program, Version 6.3.1. Elevation data in the effective HEC-RAS model is referenced to NGVD29, with the effective flood insurance study being referenced to NAVD88. The HEC-RAS digital files included in this submittal are referenced to NAVD88 using the correction factor specified in the FIS Report of 4.2. A total of four hydraulic models were prepared as a part of this study. They include a Duplicate Effective Multiple Profile Model, a Duplicate Effective Floodway Model, a Corrected Effective / Existing Conditions Multiple Profile Model, and a Corrected Effective / Existing Conditions Floodway Model.

4.1 Duplicate Effective Model

Duplicate Effective Models of the multiple profile run and floodway run were assembled from copies of the hydraulic models used in the effective FIS. The entire effective hydraulic model prepared by Icon Engineering under contract with FEMA for Flat Creek from its confluence with the Snake River upstream to High School Road is included in the Duplicate Effective Models. The Duplicate Effective Multiple Profile Model includes the 10%, 2%, 1%, and 0.2% annual-chance flood events in accordance with the effective FIS.

Negative surcharges in the Duplicate Effective Floodway Model results were observed at Cross Sections 4334, 10464, 10490, 12138, and 25922. In addition, floodway surcharges in excess of one foot were observed in this model at Cross Sections 16335, 16348, 21648, and 2167. These floodway surcharge anomalies largely occur at bridge locations, and are assumed to result from application of a newer software version. It is beyond our scope to resolve these surcharge anomalies, since they occur outside of the segment of Flat Creek being revised. The entire reach length studied by Icon Engineering is included in this submittal as a convenience to the MT-2 Review Consultant in assembling one seamless model. However, the models can be truncated upon request.

A comparison of the results published in the FIS Floodway Data Table in the revision area for Flat Creek and the Duplicate Effective Model results are shown in Table 2.

Table 2. FIS vs. Duplicate Effective (DE) Model Results

Cross Section	FIS BFE without Floodway (feet)	DE Model without Floodway (feet)	FIS BFE With Floodway (feet)	DE Model With Floodway (feet)
28048 (X)*	6063.3	6063.3	6064.2	6064.2
28908 (Y)*	6065.4	6065.4	6066.2	6066.2
30074 (Z)*	6068.9	6068.9	6069.1	6069.1
31615 (AA)*	6075.1	6075.1	6075.4	6075.4

* Effective FIS lettered cross section

4.2 Corrected Effective Models

The Corrected Effective Model incorporates newer and more accurate topographic data referenced in Section 2 ñTopographic Dataò, and updated hydrologic values referenced in Section 3 ñHydrologic Analysisò at Cross Sections 28908 through 34540. In addition, the Corrected Effective Model includes the addition of one cross section to further refine the base flood computation. Cross Section 32262 was added upstream of the Big Trail Drive Bridge, which is not present in the Duplicate Effective Model. This cross section is better positioned just upstream of the flow contraction reach that often occurs upstream of bridge openings than Cross Section 32973 given in the effective model. In accordance with the HEC-RAS Userôs Manual, this cross section is referenced as Cross Section 4 in the bridge modeling routine.

The Corrected Effective models tie in to the effective FIS at X at the downstream end and Cross Section AD at the upstream end. Table 3 provides a comparison of the BFE between the Corrected Effective Model and the Duplicate Effective Model.

Ineffective flow areas were assigned to areas inundated with flood water that are not actively being conveyed. This occurs upstream and downstream of bridges and other constrictions or in areas where flood water has been isolated from the main channel and is unable to flow downstream. In the right overbank area upstream of Big Trail Drive, ineffective flow areas were placed on high ground east of existing housing units. Flood water that may migrate to this area is isolated from the main channel and unable to flow downstream. Exclusion of this area from the hydraulic conveyance computation yields a more conservative calculated water surface elevation. Flood depths were determined in this area of ineffective flow using the calculated BFE and a digital elevation model based on the 2015 LiDAR survey. Areas with base flood depths less than one foot were placed in the X (shaded) Zone.

Channel bank stations within the revision area have been adjusted based on ground survey data from Badger Aerial Mapping and Surveying. All other variables, including roughness coefficients, channel flow lengths, overbank flow lengths, and expansion and contraction coefficients remain the same between the Duplicate Effective Model and the Corrected Effective Model.

Table 3. Duplicate Effective (DE) vs. Corrected Effective (CE) Model Results

Cross Section	FEMA Lettered Cross Section	DE Model BFE (feet)	CE Model BFE (feet)	Difference CE-DE (feet)
28048	X	6063.26	6063.26	0.00
28908	Y	6065.42	6065.52	-0.10
30074	Z	6068.87	6068.36	-0.51
31220		6071.77	6070.46	-1.31
31558		6074.70	6071.81	-2.89
31615	AA	6075.05	6073.65	-1.40
32262		----------	6074.67	----------
32973	AB	6076.67	6075.30	-1.37
34540		6079.84	6079.87	0.03
35470	AC	6081.53	6081.19	-0.34
36595	AD	6084.70	6084.70	0.00

A Corrected Effective Floodway Model was prepared from the Corrected Effective Multiple Profile Model. Floodway encroachment stations from the Duplicate Effective Floodway Model were assigned to the cross sections in the Corrected Effective Floodway Model upstream and downstream of the revision area using Method 1. Floodway encroachment stations within the revision area were initially computed using the equal conveyance reduction method (Method 4), and later converted to Method 1.

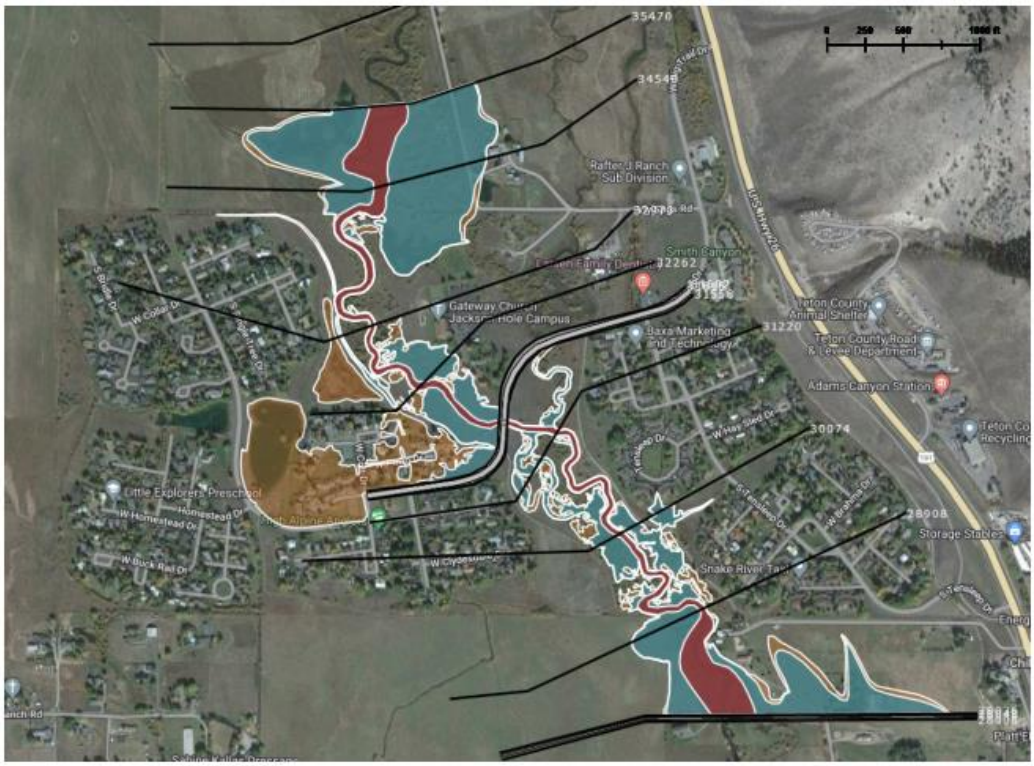
The reduction in base flood peak discharge allows encroachment up to the channel banks without exceeding the maximum one foot surcharge. Therefore, the floodway encroachment stations were set at the channel bank stations at Cross Sections 28908 through 32973.

6. Conclusion

This study is being submitted to update the Flat Creek flood hazard information within the Rafter J Ranch Subdivision, primarily to reflect updated peak discharge values for the various magnitude flood events studied by FEMA, which were approved under a Conditional Letter of Map revision (Case No.: 20-08-1005R-560094). In addition, newer and more accurate topographic data was employed to update cross section geometry in the hydraulic model and delineate resultant Zone AE and X (shaded) floodplain boundaries. The revised Floodway, AE, and X (shaded) limits are shown on Figure 3. In this figure, the revised floodway is shown in red, the revised AE Zone is shown in blue, and the revised X (shaded) Zone is shown in brown

A certified topographic work map and other required submittal information reflecting the updated flood hazard information proposed as a part of this LOMR are included with this report.

Figure 3. Revised Flat Creek Flood Hazard Information within Rafter J Ranch Subdivision



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