



Northern Hydrology & Engineering

1225 Central Avenue, Suite 15, McKinleyville, CA 95519
Telephone: (707) 839-3086; email: nhe@northernhydrology.com

Engineering – Hydrology – Stream Restoration – Water Resources

TECHNICAL MEMORANDUM

Date: 26 June 2014

To: Hank Seemann
Deputy Director - Environmental Services
Humboldt County Public Works Dept.
1106 Second Street
Eureka, CA 95501

From: Jeffrey K. Anderson, P.E.
Corin Pilkington



26 June 2014

Re: Blue Lake Levee Evaluation – Water Surface Elevation Estimates for Mad River 100-yr Flood Flow near the City of Blue Lake, Humboldt County, California

Introduction

The purpose of this technical memorandum is to provide water surface elevations along the Blue Lake Levee (Levee) for the 100-yr flood conditions in the Mad River and North Fork Mad River, Humboldt County, CA. Water surface elevations are provided at eight geotechnical transect locations (Figure 1) identified by CGI Technical Services, Inc. (CGI). The hydraulic models used in this analysis are the HEC-RAS models developed as part of Humboldt County's FEMA floodplain mapping update for the Mad River near the City of Blue Lake (NHE and Manhard, 2013a; Kimley-Horn, 2014). All water surface elevations are provided in feet referenced to the NAVD88 vertical datum.

Analysis Approach

The 100-yr flood flows used in this assessment were the estimates used for the County's floodplain mapping efforts (NHE and Manhard, 2013b). The 100-yr flood flow estimates for the Mad River are 67,600 cfs above North Fork Mad River, and 74,700 cfs below North Fork Mad River. The North Fork Mad River 100-yr flood flow estimate is 20,500 cfs.

Two HEC-RAS models were developed for the County's FEMA floodplain mapping effort, one for the mainstem Mad River and another for North Fork Mad River. The above 100-yr flows were used in the HEC-RAS models to predict water surface elevations along the Blue Lake Levee at the CGI transect locations (Figure 1). The 100-yr flood elevations were extracted from a triangular irregular network (TIN) flood elevation surface (100-yr flood TIN) created for both HEC-RAS models using each model's geo-referenced cross-sections and their associated 100-yr flood elevations. Both 100-yr flood TINs were sampled at the eight CGI transect locations.

Water Surface Elevations

The maximum water surface elevations for the 100-yr flood flow at the CGI transects (Figure 1) are summarized in Table 1, and represent the values that should be used in the geotechnical evaluation of the Levee. Table 1 also presents the typical levee crest elevation at each transect based on LiDAR data collected in November 2011 for the County's FEMA floodplain mapping update, and the associated levee freeboard (levee elevation minus water surface elevation).

Table 2 provides the 100-yr flood elevations for the CGI transects from both the Mad River and North Fork Mad River HEC-RAS model predictions.

References

Kimley-Horn & Associates, Inc. 2014. Floodplain mapping for Mad River, Humboldt County, California. Prepared for Humboldt County Public Works Department, dated May 2014.

Northern Hydrology and Engineering (NHE) and Manhard Consulting (Manhard). 2013a. Hydraulic analysis for Mad River near the City of Blue Lake, Humboldt County, California. Prepared for Humboldt County Public Works Department, draft dated 21 May 2013.

Northern Hydrology and Engineering (NHE) and Manhard Consulting (Manhard). 2013b. Hydrologic analysis for Mad River near the City of Blue Lake, Humboldt County, California. Prepared for Humboldt County Public Works Department, final dated 8 February 2013.

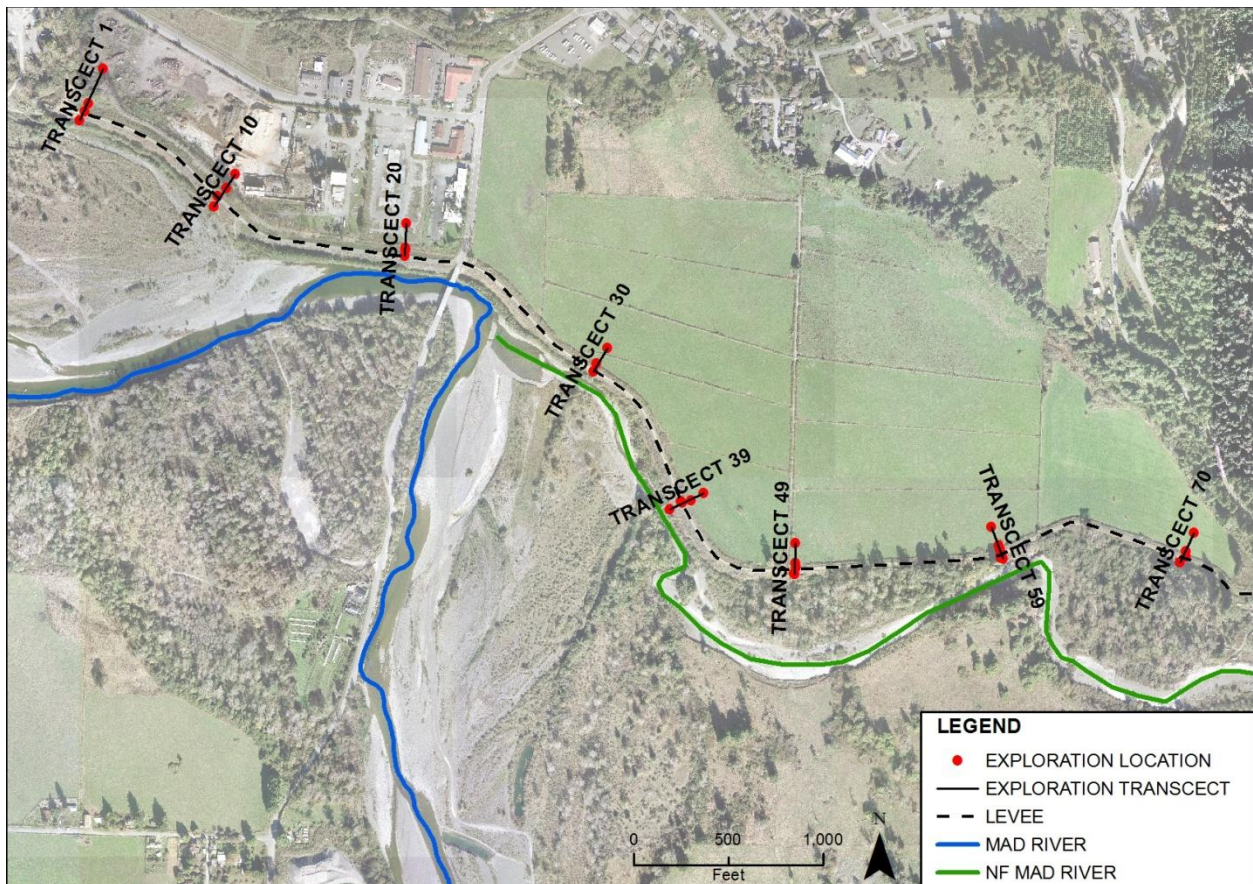


Figure 1. GCI Technical Services, Inc. geotechnical transect locations along the Blue Lake Levee.

Table 1. Maximum 100-yr flood water surface elevations, levee crest elevations, and levee freeboard at the CGI geotechnical transects.

Geotechnical Transect Number	Maximum 100-YR Water Surface Elevation (ft, NAVD88)	Levee Crest Elevation at Geotechnical Transect (ft, NAVD88)	Levee Freeboard at 100-yr Flood
1	78.19	89.8	11.6
10	81.83	92.7	10.9
20	89.55	94.5	5.0
30	92.51	97.6	5.1
39	92.59	100.0	7.4
49	93.21	100.5	7.3
59	95.40	101.4	6.0
70	97.07	103.8	6.7

Table 2. 100-yr flood water surface elevations at the CGI geotechnical transects for the Mad River and North Fork Mad River HEC-RAS models.

Geotechnical Transect Number	100-yr Water Surface Elevation for Mad River HEC-RAS Model (ft, NAVD88)	100-yr Water Surface Elevation for North Fork Mad River HEC-RAS Model (ft, NAVD88)
1	78.19	Not Applicable
10	81.83	Not Applicable
20	89.55	Not Applicable
30	92.51	77.80
39	92.59	80.83
49	93.21	91.46
59	95.12	95.40
70	Not applicable	97.07