

REQUEST FOR BOARD ACTION
HENDERSON COUNTY
FLOOD DAMAGE PREVENTION BOARD

MEETING: September 24, 2015

SUBJECT: Special Fill Permit for Etowah Boating Access

PRESENTER: Toby Linville

ATTACHMENTS: Staff Report

SUMMARY OF REQUEST:

The NC Wildlife Resources Commission on behalf of Henderson County will construct a boating access ramp and floating pier along the French Broad River at Brevard Rd near Cummings Rd. This project will require a Special Fill Permit because the WRC will need to fill more than 20% of the land area in the floodplain for parking and driveway access. The ZBA acting as the Flood Damage Prevention Board must consider whether this additional fill

Suggested Motion:

I recommend approval to the Flood Damage Prevention Board for approval of a Special Fill Permit for the Etowah Boating Access.



Henderson County, North Carolina Code Enforcement Services

1. Board Request

- 1.1. **Applicant:** NC Wildlife Resources Commission for Henderson County
- 1.2. **Request:** Special Fill Permit
- 1.3. **PIN:** 9539430929
- 1.4. **Size:** 1.69 acres +/-
- 1.5. **Location:** The subject area is located off Brevard Road near Cummings Road
- 1.6. **Supplemental Requirements:**

SR 4.13. Park

- (1) Site Plan. Major *Site Plan* required in accordance with §42-331 (Major Site Plan Review).
- (2) Lighting. *Lighting mitigation* required.

A. Purpose. *Special Fill Permits* in the *flood fringe* may be granted by the Flood Damage Prevention Board in particular cases meeting specific community need and subject to appropriate conditions and safeguards. (1) Proposed *encroachment* would not result in any increase in the flood levels during the occurrence of the *base flood*; and,

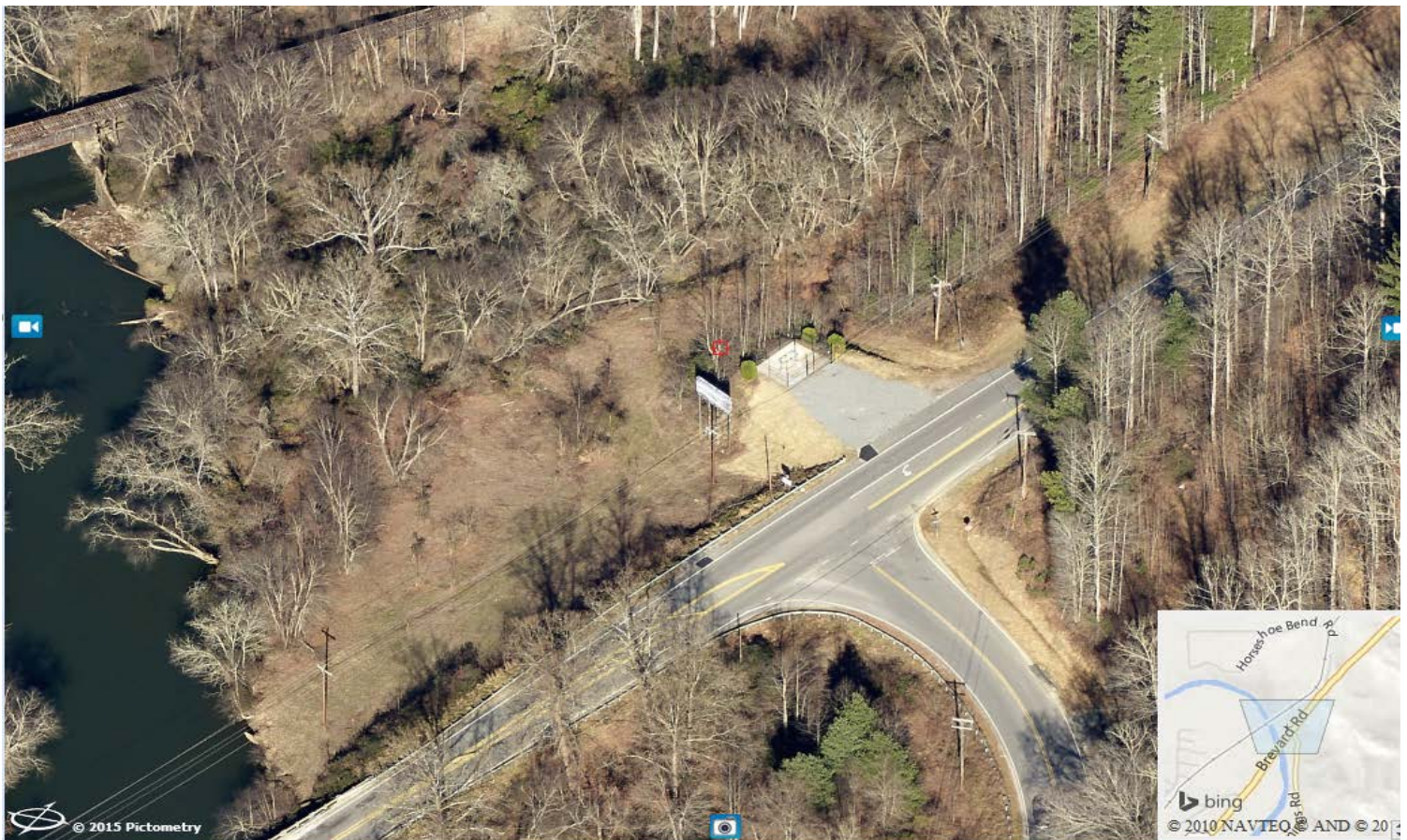
(2) *Special Fill Permit*, if granted will result in no net decrease in flood storage capacity on the parcel upon which the fill is proposed; and,

(3) Proposed *encroachment* will not violate any other Federal, State or Henderson County laws, rules, ordinances, or regulations; and,

(4) *Special Fill Permit*, if granted, will comply with the *Comprehensive Plan*, and that, if granted, it will advance a public or community purpose, and that such purpose is sufficiently substantial to justify issuance of the *Special Fill Permit*.

Any grant of a *Special Fill Permit* by the Flood Damage Prevention Board may include conditions, which must be satisfied by the *applicant*. These conditions must be based on evidence presented at the hearing, and must be related to increasing the flood-control capabilities of the parcel for which the fill permit is sought.

Map A: Aerial Photo/Pictometry



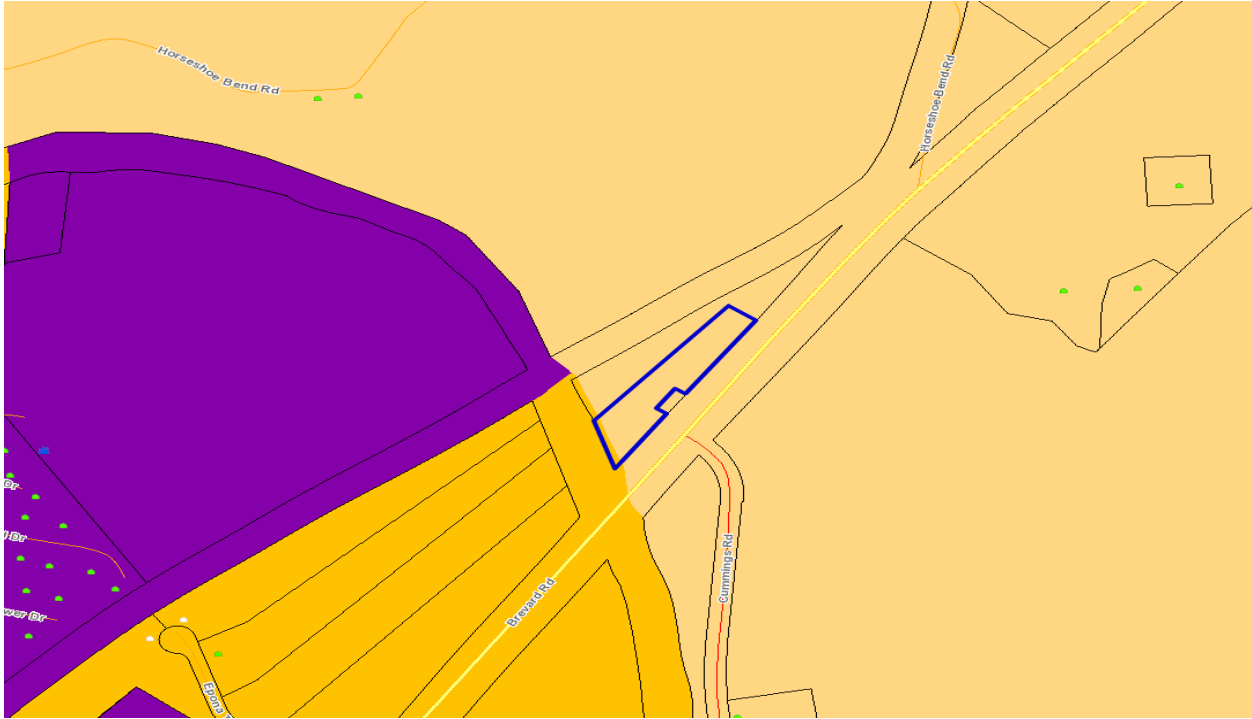
2. Current Conditions

Current Use: The property is currently vacant.

Adjacent Area Uses: The surrounding properties primarily consist of residential use. Etowah –Horse Shoe Fire Department is approximately ½ mile west.

Zoning: The surrounding property to the north and east is zoned Residential 2 Rural, NW is Industrial and SW is Residential 1.

Map B: Current Zoning

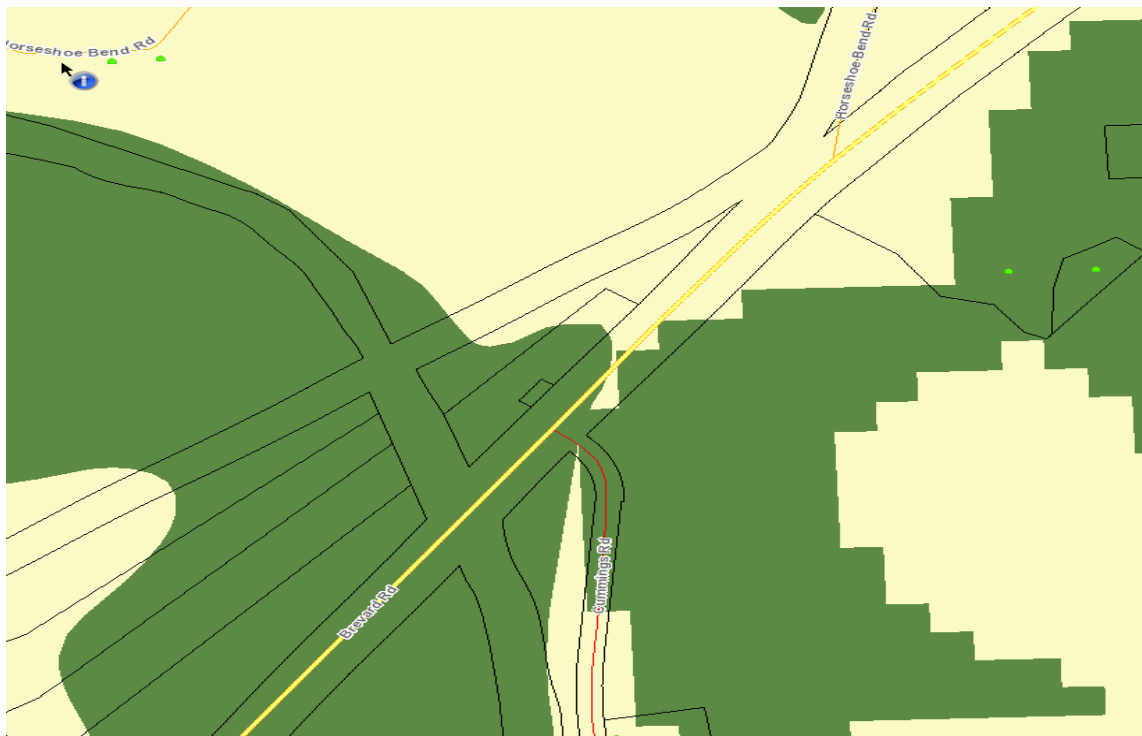


- 3. Floodplain /Watershed Protection**-The property is located in the Special Flood Hazard Area (Floodway and 100-year Floodplain). The property is located in the Upper French Broad River WS-IV Protected Area Water Supply Watershed District.



4. **Water and Sewer:** Private well and septic system serves this property.
 - 4.1. **Public Water:** Public water is available for this property.
 - 4.2. **Public Sewer:** Public sewer is not available for this property.

Map C: CCP Future Land Use Map



5. **Comprehensive Plan**

The 2020 CCP: The CCP Future Land Use Map places the Subject Area in the Conservation Area. The text and map of the 2020 CCP suggest that the Subject Area would be more suitable for the following:

This category includes land areas that are intended to remain largely in their natural state, with only limited development. Such areas should be targeted for protection through regulations and incentives. Conservation areas are lands that generally exhibit any of the following characteristics:

1. Sensitive natural areas such as steep slopes, floodplains, major wetlands, forest reserves and wildlife conservation areas, and key watersheds
2. Areas of historic and archeological significance
3. Local, state or federally-managed natural areas
4. Areas managed for agricultural or forestry land uses
5. Other areas yet to be defined

6. **Staff Recommendations**

Staff's position at this time, under the guidelines of current plans, policies and studies, is to approve the major site plan and recommend approval of the Special Fill Permit because it meets the requirements of the Land Development Code. TRC recommended approval of site plan and approval of Special Fill Permit.

7. **Photographs**







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French Broad River US-64 Float Fishing Access Etowah North Carolina No-Rise Flood Study

Henderson County, North Carolina
July 2, 2015



Prepared For:
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1. Effective Model 100-year & Floodway
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3. Pre-Project Model 100-year & Floodway
4. Post-Project Model 100-year & Floodway

Appendix E – Construction Plans

French Broad River US-64 Float Fishing Access Henderson County, North Carolina

1.0 Introduction

The US-64 Float Fishing Access is planned for construction on the French Broad River in Etowah, Henderson County downstream of the US-64 Bridge by the North Carolina Wildlife Resources Commission.

2.0 Background

The proposed US-64 Float Fishing Access Area lies between the US-64 Road Bridge and an existing railroad trestle on the French Broad River in Henderson County. The two bridge structures are located approximately 550 feet apart. The property for the proposed access area is adjacent to and downstream of the northern right of way line on US-64. The project includes a public boat ramp and a paved parking area that will be accessed from US-64. The purpose of this project is to determine the effects of the proposed improvements within the FEMA regulated floodplain and floodway of the French Broad River.

3.0 No Encroachment Alternative

The proposed boat ramp will not be able to be installed without encroaching into the floodplain and floodway of the French Broad River. The launch requires access to the water and stream channel to function and therefore a no encroachment alternative is not possible for this project.

4.0 Encroachment Alternative

Encroachment within the floodplain and floodway is required for the planned boat launch into the French Broad River. The proposed project has minimized impacts within the encroachment area. The improvements include grading within the floodplain for parking areas and proposed boat launch. The boat launch is located in the floodway of the stream along with a portion of the parking lot. The remaining parking lot and access road are located in the floodplain. The right (eastern) stream bank will be excavated where the ramp is to be placed. Cut and fill is being placed within the floodplain for the construction of a parking area and roadway access to the launch. The project fill and excavation elevations have been minimized.

5.0 Analysis

5.1 Effective Model

The effective FEMA HEC-2 detail study models were obtained from the North Carolina Flood Mapping program for the French Broad River. Paper files of the HEC-2 input and output data were sent of the effective model. The effective model had to be recreated in HEC-RAS from the HEC-2 input data as a digital copy of the HEC-2 model was not available for import into the HEC-RAS model. The following steps were taken for the recreation of the model. A

truncated portion of the model was used for the no-rise study. The model was started at River Station 174.2 and ended at River Station 180.82.

- GR record data from River Station 174.2 to 180.82 were entered into a station and elevation format into an excel spread sheet. Data was cut off on the paper print out of the data for cross sections 177.04, 177.15, and 180.25. The missing data for cross section 177.04 was recreated by copying the data from next upstream cross section which is also labeled as 177.04. The missing data for cross section 177.15 is part of the bridge data for the high and low chords. The missing data was recreated by mirroring the available data and verifying that it matched the cross section grade. The missing data for cross section 180.25 was recreated by maintaining similar slopes and stream banks to the upstream and downstream cross sections. The center line stations varied in station number for each section.
- The effective model stations through the railroad bridge and the US-64 Bridge were in the original model with the same station of 177.04 and 177.15 respectively due to the stations being called out as river miles. The distances were measured between river station 9390 and 9251 shape file information downloaded from NC Flood Maps web site. The cross section stations were measured and adjusted and converted into distances in feet. The distances in feet assigned to each section were then converted back to river miles for the effective model. The table below shows the adjustments.

Effective HEC-2 Stations in river miles	Description	Measured and Adjusted Stations in feet	Effective HEC-RAS model stations converted from feet to river miles
Rail Road Bridge Sections			
177.04		935155	177.1127
177.04		935185	177.1184
177.04	DS Face	935186	177.1186
177.04	US Face	935216	177.1242
177.04		935217	177.1244
US-64 Sections			
177.15		935728	177.2212
177.15	DS Face	935733	177.2222
177.15	US Face	935763	177.2278
177.15		935768	177.2288
177.15		935788	177.2326

- River station 177.8 was located in the effective model an equal distance between the US-64 Bridge and the railroad trestle. The measured distance however did not match the distance in the model. This cross section was re-stationed to keep it in the location intended in the original model with the corrected distance. Therefore this station at 177.08 was determined to be at river station 935466 feet. The river station in feet was converted to river miles and entered into the effective model at station 177.1716.

- The station of each cross section at the center line for the river at each cross section was determined by measuring locating the top of banks in the cross section and approximating the station in the cross section. The center line stations for each cross section in the model is shown in the following table.

Effective Cross Section	Center of Channel Station
180.82	1600
180.25	2150
178.65	815
177.85	890
177.2326	2367
177.2288	2403
177.2278	2403
177.2222	2403
177.2212	2403
177.1716	1510
177.1244	1510
177.1242	1510
177.1186	1510
177.1184	1510
177.1127	1512
176.35	280
175.2	280
174.2	580

- The n values for the cross sections were obtained from the NC and NH records in the HEC-2 data. The only cross section with variable n values is at River Station 180.82.
- The expansion and contraction coefficients were obtained from the NC records in the model. In the effective model the contraction coefficient was set at 0.1 and the expansion at 0.5 throughout the entire section of the model that was truncated for this study with no changes for the bridges.
- The station of the left bank of the channel, right bank of the channel, left overbank, right overbank and length of channel between cross sections were obtained from the X1 records at each cross section. In the case where the cross section data was repeated and adjusted by an elevation constant it was applied to the cross section elevations in the excel spreadsheet. This adjustment only occurred at effective River Station 176.30.
- Existing RR Trestle: The railroad bridge was described in the BT cards with the low chord and top of road/track elevations. The piers for the trestle were coded into the GR records as obstructions in the ground data. The data was entered into the model to match the effective HEC-2 modeling. Ineffective flow limits were added as follows to the model.

River Station	Lt. Ineffective Station/Elev (ft)	Rt Ineffective Station/Elev (ft)
177.1186	1014.0 / 2078.40	1750 / 2082
177.1242	1014.0 / 2078.40	1750 / 2082

- Existing US-64 Bridge: The downstream bridge face, piers, abutments, and ground was surveyed for the eastern bridge on NC-64 and compared to the HEC-2 model data. The information lined up and therefore there have not been any upgrades to the bridge prior to this study and therefore the data was current.

River Station	Lt. Ineffective Station/Elev (ft)	Rt Ineffective Station/Elev (ft)
177.2278	1415 / 2080.8	2530 / 2080.9
177.2222	1415 / 2080.8	2530 / 2080.9

- The flow file for the HEC-RAS model was created from the discharges shown on the QT record for the 100-yr (field 4) and 100-yr floodway (field 6).
- The starting boundary condition was entered into the model as known water surface elevation at River Station 174.20. The elevations were obtained from the hard copy of the output file that was received from NC Floodplain Mapping Program. The output data included the output from the multiple profile run. The water surface elevation shown in the data for the 100-year storm event is 2073.0. The published Floodway Data Table in the effective FIS Report for Henderson County Dated October 2, 2008 for cross section 919776 is 2072.9 and the floodway elevation is 2073.8 with an increase of 0.9 feet shown. The data in the published data table was used in the HEC-RAS model.
- The effective floodplain and floodway boundaries on Map Number 3700953900J, FIRM panel 9539 within the project area. Sections 9354 and 9348 are the published stations upstream and downstream of the project area. The shape files for the floodway were downloaded from NC Flood Maps web site. The floodway limits were scaled from the shape file locations. Minimal encroachment information was provided in the HEC-2 data print out. Some of the cross sections had scaled encroachments that were outside of the limits of the flood water and they had to be adjusted. The floodway was also adjusted to around the bridge abutments to fall inside the bridge. An approximate 4:1 expansion line was set for the encroachment between the US-64 Bridge and the railroad bridge downstream. The adjusted floodway lines within the project area are shown on the work map. The table below shows the measured versus the adjusted encroachment stations for the cross sections that were adjusted.

River Station	Left Encroachment Measured Station	Left Encroachment Adjusted Station	Right Encroachment Measured Station	Right Encroachment Adjusted Station
177.2323	1067	1352	2521	2502
177.2288	1387	1415	2562	2529
177.2278	1392	1415	2564	2529
177.2222	1418	1416	2571	2529
177.2212	1422	1416	2572	2529
177.1716	990	990	1658	1645
177.1244	995	1014	1713	1736
177.1242	995	1016	1713	1736

177.1186	998	1016.5	1720	1736
177.1184	998	1016	1720	1736
177.1127	1004	1016	1722	1735

The floodway encroachment stations left and right entered into the effective model are shown in the following table.

River Station (miles/feet)	Left Encroachment Station	Right Encroachment Station
180.82 / 954,729	661	1780
180.25 / 951,720	713	2612
178.65 / 943,272	471	1524
177.85 / 939,048	819	1370
177.2326 / 936,788	1352	2502
177.2288 / 935,768	1415	2529
177.2278 / 935,763	1415	2529
177.2222 / 935,733	1416	2529
177.2212 / 935,728	1416	2529
177.1716 / 935,466	990	1645
177.1244 / 935,217	1014	1736
177.1242 / 935,216	1016	1736
177.1186 / 935,186	1016.5	1736
177.1184 / 935,185	1016	1736
177.1127 / 935,155	1016	1735
176.35 / 931,751	180	1973
175.2 / 925,926	180	1973
174.2 / 919,776	202	1154

- The effective model was run and the water surface elevations were compared to the published water surface elevations in the following table. The recreated HEC-RAS model compares within +/- 0.1 of a foot within the project area from River Stations 174.2 through US-64 Bridge at Station 177.15. The comparison at the railroad bridge was made at the downstream face and the upstream face at the Us-64 Bridge. These locations correspond with the published profile elevations. The cross sections beginning approximately 3300 feet upstream of US-64 compare within a range of -0.67 to +0.53 foot.

100-Year Floodplain Comparison

	WSEL (ft)	WSEL (ft)	
River Station (miles / feet)	Published Data	Effective HEC-RAS Model	Difference Effective - Published
180.82/954730	2082.6	2081.93	-0.67
180.25/951,720	2081	2081.44	0.44
178.65/943,272	2080.2	2080.73	0.53

	WSEL (ft)	WSEL (ft)	
River Station (miles / feet)	Published Data	Effective HEC-RAS Model	Difference Effective - Published
177.85/939,048	2078.6	2079.22	0.62
177.15/935,352	2077.3	2077.22	-0.08
177.04/934,771	2075.3	2075.24	-0.08
175.2/925,056	2073.7	2073.77	0.07
174.2/919776	2072.9	2072.9	0

100-Year Floodway Comparison

	WSEL (ft)	WSEL (ft)	
River Station (miles / feet)	Published Data	Effective HEC-RAS Model	Difference Effective - Published
180.82/954730	2083.1	2082.95	-0.15
180.25/951,720	2082	2082.46	0.46
178.65/943,272	2081.1	2081.63	0.53
177.85/939,048	2079.2	2079.88	0.68
177.15/935,352	2078	2077.91	-0.09
177.04/934,771	2076.3	2076.15	-0.16
175.2/925,056	2074.7	2074.72	0.02
174.2/919776	2073.8	2073.8	0

5.2 Corrected Effective Model

Since the water surface elevations produced with the re-created effective model compared well within the project area between the two bridges it was copied to the corrected effective model and further modified. The effective model FrenchBroad.p01 geometry file FrenchBroad.g01 was copied to geometry file FrenchBroad.g02, renamed to Corrected Effective and further modified as follows:

- All of the River Stations in the geometry file previously referred to in miles were converted to feet.
- Ineffective flow limits were set at all of the bridge cross sections as well as cross section 935466 in between the two bridges. The ineffective flow limits were set at the most restrictive limit of either the expansion of flow downstream of the bridge at a 1:4 rate or the contraction into the bridge at a 1:1 rate. The following table shows the additional ineffective flow limits that were added to the corrected effective model. The expansion and contraction limit lines have been shown on the plan drawing for reference.

River Station	Station Left	Elevation Left	Station Right	Elevation Right
935788	1352	-	2517	-
935768	1410	2080.8	2535	2080.9
735763	1415	2080.8	2530	2080.9

River Station	Station Left	Elevation Left	Station Right	Elevation Right
935733	1415	2080.8	2530	2080.9
935728	1413	2080.8	2532	2080.9
935466	947	-	1645	-
935217	1014	2078.4	1750	2082
935216	1014	2078.4	1750	2082
935186	1014	2078.4	1750	2082
935185	1016	2078.4	1750	2082
935155	1016	-	1760	-

*Note values in blue included in Effective Model

- Actual distances between cross sections as measured from LIDAR Data were adjusted in the model.

River Station	Downstream Distance Effective Model	Downstream Distance Corrected Effective Model
954729	3035	2493
951720	7935	8316
943272	4465	4322
939048	3100	3260
935788	20	20
935768	5	5
935763	30	30
935733	5	5
935728	200	262
935466	200	249
935217	1	1
935216	30	30
935186	1	1
935185	30	30
935155	3907	3404
931751	5300	5825
925926	5300	5422
919776	4450	4450

- The contraction and expansion coefficients were set in the effective model as .1 and .5 respectively. The contraction coefficient was changed through the US-64 Bridge downstream through the railroad bridge to 0.3. Cross sections 935788 through 935155, excluding section 935466, contraction coefficients were changed to reflect a 0.3 value.
- Modifications were made to Cross Section 935466 to model the existing surveyed topography.

The effective floodway file was changed to reflect the new river stationing in feet and renamed Floodway CE.f02. The plan was saved as Corrected Effective.p02. The following table compares the Corrected Effective model and Effective Model water surface elevations.

River Station	Corrected Effective WSEL (ft)		Effective WSEL (FT)		Difference Corrected Effective-Effective WSEL (ft)	
	100-YR	100 FW	100-YR	100 FW	100-YR	100 FW
954729	2082.05	2083.01	2081.93	2082.95	0.12	0.06
951720	2081.68	2082.64	2081.44	2082.46	0.24	0.18
943272	2080.99	2081.8	2080.73	2081.63	0.26	0.17
939048	2079.61	2080.17	2079.22	2079.88	0.39	0.29
935788	2078.38	2078.94	2078.04	2078.64	0.34	0.3
935768	2077.56	2078.2	2077.31	2078	0.25	0.2
935763	2077.46	2078.1	2077.22	2077.91	0.24	0.19
935748	Railroad					
935733	2077.14	2077.77	2076.92	2077.61	0.22	0.16
935728	2077.16	2077.79	2076.94	2077.63	0.22	0.16
935466	2077.04	2077.66	2076.98	2077.52	0.06	0.14
935217	2076.84	2077.5	2076.65	2077.36	0.19	0.14
935216	2075.8	2076.58	2075.77	2076.59	0.03	-0.01
935201	US-64					
935186	2075.12	2076.04	2075.24	2076.15	-0.12	-0.11
935185	2075.5	2076.37	2075.61	2076.48	-0.11	-0.11
935155	2075.49	2076.35	2075.62	2076.46	-0.13	-0.11
931751	2074.32	2075.25	2074.23	2075.17	0.09	0.08
925926	2073.78	2074.73	2073.77	2074.72	0.01	0.01
919776	2072.9	2073.8	2072.9	2073.8	0	0

5.3 Pre-Project Model

The Corrected Effective model was copied and re-named as Pre-Project. Modifications were made to the Pre-Project model to include additional cross sections at locations within the project area to model the proposed improvements. The Corrected Effective model FrenchBroad.p02 geometry file FrenchBroad.g02 was copied to geometry file FrenchBroad.g03, renamed to Pre-Project and further modified as follows:

- Cross Sections 935409, 935431, 935553 were added to the model to represent locations of improvements that will be coded into the post-project model.
- The “n” values established for the channel and overbank in the Corrected Effective model were applied to the added sections. Manning’s ‘n’ values were established on the added cross sections to reflect the current land use and ‘n’ values used in the Effective model.
- Stream and overbank distances were adjusted to accommodate the additional cross sections.

- Contraction and expansion values were set at 0.1 and 0.5, respectively, at the added cross sections.
- Ineffective flow limits were set at the added sections based on the published FIRM floodway limit and flow transitions from the bridges. The ineffective flow limits are shown in the table below:

River Station	Ineffective Flow Left Station	Ineffective Flow Right Station
935409	969	1660
935431	961	1655
935553	818	1633

- Encroachment limits were set for the added cross sections based on measured distances from the published Firm floodway line as shown in the table below.

Station	Encroachment	
	Left	Right
935409	1006	1660
935431	998	1655
935553	948	1633

The model was run and the pre-project water surface elevations compared with the extended effective model elevations as shown in the following table.

River Station	Pre-Project WSEL (ft)		Corrected Effective WSEL (ft)		Difference Pre-Project-Corrected Effective WSEL (ft)	
	100-YR	100 FW	100-YR	100 FW	100-YR	100 FW
954729	2082.05	2083.01	2082.06	2083.02	-0.01	-0.01
951720	2081.68	2082.63	2081.69	2082.65	-0.01	-0.02
943272	2080.98	2081.79	2081	2081.81	-0.02	-0.02
939048	2079.61	2080.16	2079.63	2080.18	-0.02	-0.02
935788	2078.37	2078.93	2078.4	2078.96	-0.03	-0.03
935768	2077.55	2078.18	2077.59	2078.22	-0.04	-0.04
935763	2077.45	2078.08	2077.48	2078.1	-0.03	-0.02
935748	Railroad					
935733	2077.12	2077.74	2077.16	2077.77	-0.04	-0.03
935728	2077.14	2077.76	2077.18	2077.79	-0.04	-0.03
935553	2077.2	2077.75				
935466	2077.07	2077.68	2077.09	2077.67	-0.02	0.01
935431	2077.03	2077.64				
935409	2077.01	2077.63				
935217	2076.84	2077.5	2076.84	2077.5	0	0

River Station	Pre-Project WSEL (ft)		Corrected Effective WSEL (ft)		Difference Pre-Project-Corrected Effective WSEL (ft)	
	100-YR	100 FW	100-YR	100 FW	100-YR	100 FW
935216	2075.8	2076.58	2075.8	2076.58	0	0
935201	US-64					
935186	2075.12	2076.04	2075.12	2076.04	0	0
935185	2075.5	2076.37	2075.5	2076.37	0	0
935155	2075.49	2076.35	2075.49	2076.35	0	0
931751	2074.32	2075.25	2074.32	2075.25	0	0
925926	2073.78	2074.73	2073.78	2074.73	0	0
919776	2072.9	2073.8	2072.9	2073.8	0	0

5.4 Post Project Model

The Pre-Project model was copied and re-named as Post-Project. Modifications were made to the Post-Project model to include additional cross sections at locations within the project area to model the proposed improvements. The Pre-Project model FrenchBroad.p03 geometry file FrenchBroad.g03 was copied to geometry file FrenchBroad.g04, renamed to Post-Project and further modified as follows:

- Improvements at the cross sections within the proposed public boating access area were made to reflect the proposed construction plans prepared by the NC Wildlife Resources Commission. Improvements include grading and n-value adjustments in all cross sections within the proposed public boating access area as well boat ramp excavation at cross sections 935409, 935431, 935466. Cross sections showing a comparison of pre and post-project geometry are included in Appendix C.
- Manning’s “n” values were changed in the post project model to represent the conditions of the improvements such as the loss of vegetated areas with the addition of the parking area and addition of vegetated rip rap to the stream buffer at the ramp. The parking lot was modeled with an n-value of 0.025. The maintained areas were modeled with an n-value of 0.035.

The post project model was run and the water surface elevations compared to the pre-project model as shown in the table below.

River Station	Post-Project WSEL (ft)		Pre-Project WSEL (ft)		Difference Post-Project-Pre-Project WSEL (ft)	
	100-YR	100 FW	100-YR	100 FW	100-YR	100 FW
954729	2082.04	2083	2082.05	2083.01	-0.01	-0.01
951720	2081.67	2082.62	2081.68	2082.63	-0.01	-0.01
943272	2080.97	2081.78	2080.98	2081.79	-0.01	-0.01
939048	2079.59	2080.14	2079.61	2080.16	-0.02	-0.02

River Station	Post-Project WSEL (ft)		Pre-Project WSEL (ft)		Difference Post-Project-Pre-Project WSEL (ft)	
	100-YR	100 FW	100-YR	100 FW	100-YR	100 FW
935788	2078.35	2078.91	2078.37	2078.93	-0.02	-0.02
935768	2077.53	2078.16	2077.55	2078.18	-0.02	-0.02
935763	2077.43	2078.06	2077.45	2078.08	-0.02	-0.02
935748						
935733	2077.11	2077.73	2077.12	2077.74	-0.01	-0.01
935728	2077.13	2077.75	2077.14	2077.76	-0.01	-0.01
935553	2077.19	2077.75	2077.2	2077.75	-0.01	0
935466	2077.06	2077.68	2077.07	2077.68	-0.01	0
935431	2077.02	2077.64	2077.03	2077.64	-0.01	0
935409	2077.01	2077.63	2077.01	2077.63	0	0
935217	2076.84	2077.5	2076.84	2077.5	0	0
935216	2075.8	2076.58	2075.8	2076.58	0	0
935201						
935186	2075.12	2076.04	2075.12	2076.04	0	0
935185	2075.5	2076.37	2075.5	2076.37	0	0
935155	2075.49	2076.35	2075.49	2076.35	0	0
931751	2074.32	2075.25	2074.32	2075.25	0	0
925926	2073.78	2074.73	2073.78	2074.73	0	0
919776	2072.9	2073.8	2072.9	2073.8	0	0

6.0 Results/Conclusion

A comparison of the Pre and Post-Project Model show that the proposed US-64 Float Fishing Access dock does not cause a rise in the 100-year natural or floodway water surface elevations with the modifications shown in the attached work maps. These modifications include minor fill for the parking area/driveway, proposed dock, and excavation for the boat ramp.

7.0 Computer Models

The following computer models have been included on a CD attached to this report. All models are for the floodway run and contain the 100 year natural and 100 year floodway profiles:

Effective HEC-2 Model

PDF copy of input data – Appendix A

Effective created from HEC-2 Print-out:

Project:	French Broad	FrenchBroad.prj
Plan:	Effective	FrenchBroad.p01
Geometry:	Effective	FrenchBroad.g01
Steady Flow:	Floodway	FrenchBroad.f01

Corrected Effective:

Project:	French Broad	FrenchBroad.prj
Plan:	Corrected Effective	FrenchBroad.p02
Geometry:	Corrected Effective	FrenchBroad.g02
Steady Flow:	Floodway CE	FrenchBroad.f02

Pre-Project Final:

Project:	French Broad	FrenchBroad.prj
Plan:	Pre-Project	FrenchBroad.p03
Geometry:	Pre-Project	FrenchBroad.g03
Steady Flow:	Floodway CE	FrenchBroad.f02

Post-Project Final:

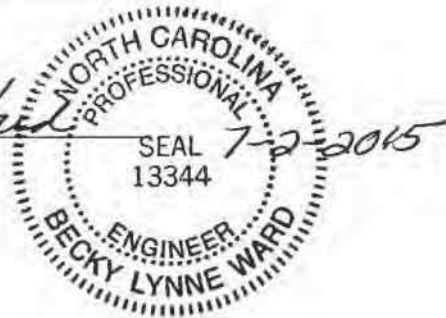
Project:	French Broad	FrenchBroad.prj
Plan:	Post-Project	FrenchBroad.p04
Geometry:	Post-Project	FrenchBroad.g04
Steady Flow:	Floodway CE	FrenchBroad.f04

ENGINEERING "NO IMPACT" CERTIFICATION

This is to certify that I am a duly qualified engineer licensed to practice in the State of North Carolina. It is to further certify that the attached technical data supports the fact that the improvements to the Etowah Small Boat Access located on the east bank of the French Broad River at Station 9354 in Henderson County, NC will not impact the 100-year flood elevations, floodway elevations, and floodway widths on Buffalo Creek. This certification includes the proposed Etowah Small Boat Access improvements planned by the NC Wildlife Resources Commission as shown on the attached work maps prepared by Ward Consulting Engineers, P.C. dated 7/2/2015.

Signature: _____

Becky L. Ward, P.E.



Ward Consulting Engineers, P.C. Firm No C-2619
Company

President
Title

4805 Green Road, Suite 100
Street Address

Raleigh, North Carolina, 27616
City, State, Zip

919-870-0526
Phone

Etowah - French Broad River Photo Log



Picture 1.0 – Northern side of the US-64 Bridge looking southwest.



Picture 2.0 – Project site.



Picture 3.0 – Project site looking southwest at US-64 bridge.



Picture 4.0 – French Broad River looking north from US-64 Bridge at the railroad bridge.



Picture 5.0 – Project site as viewed from US-64 Bridge looking northeast.

RECEIVED
9/1/2015
N9B

HENDERSON COUNTY
ENGINEERING DEPARTMENT
EROSION CONTROL DIVISION

FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

This form is to be filled out and given to Floodplain Administrator.

To be completed by FLOODPLAIN ADMINISTRATOR:		
File No.	FP2015-09-01	
Application Date:	Sept. 1 2015	
Firm Panel No.		
PIN.	9539-43-0929	
Plat Ref.:		
Building Permit No.:		
Floodplain Dev. Permit Req'd	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Issue Date

SECTION 1: General Provisions (APPLICANT to read and sign):

1. No work of any kind may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance is issued.
5. The permit will expire if no work is commenced within six months of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal regulatory requirements.
7. Applicant hereby gives consent to the Local Administrator or assigned representative to make reasonable inspections required to verify compliance.
8. TO THE BEST OF MY KNOWLEDGE, I, THE APPLICANT, CERTIFY THAT ALL STATEMENTS HEREIN AND IN

ATTACHMENTS TO THIS APPLICATION ARE TRUE AND ACCURATE

N.C. Wildlife Resources Commission - Jeff C. Ferguson, PE

September 1, 2015

(Applicant's signature)

Date

SECTION 2: Proposed Development (To be completed by APPLICANT)

The applicant must submit the following documents before the application can be processed:

A site development plan, drawn to scale, showing the location of all existing structures, topography, water bodies, adjacent roads, lot dimensions, and proposed development, showing (where applicable) anchoring structures, proposed elevation of lowest floor (including basement), types of water-resistant materials used below the first floor, details of flood proofing of utilities located below the first floor, and details of enclosures below the first floor.

Site Address (Proposed Development): Brevard Rd. (US-64) near intersection w/ Cummings Rd. (SR1171)
Proposed site entrance location: N35.329641°, W82.574011°

Applicant's Name N.C. Wildlife Resources Commission - Jeff C. Ferguson, PE (agent for Henderson County)

Mailing Address 171 Southern Cross Rd., Weaverville, NC 28787

Telephone No.: (828) 231-3517

BRIEF DESCRIPTION OF WORK :

Development of a public boating access to the French Broad River. Vacant lot will be cleared & graded to provide a gravel surfaced access road and parking area. Excavation at river bank and placement of stone in river bed to provide a base to support a reinforced concrete launch ramp and adjacent floating dock system. Installation of culverts along proposed access road and grassed swales to convey stormwater runoff to stable outlets along riprap slopes next to ramp.

A. STRUCTURAL DEVELOPMENT (Check all applicable boxes)

ACTIVITY

STRUCTURE TYPE

- | | |
|---|---|
| <input checked="" type="checkbox"/> New Structure (boat ramp, dock & signs) | <input type="checkbox"/> Residential (1-4 Family) |
| <input type="checkbox"/> Addition | <input type="checkbox"/> Residential (More than 4 Family) |
| <input type="checkbox"/> Alteration | <input checked="" type="checkbox"/> Non-residential (Floodproofing? <input type="checkbox"/> Yes) |
| <input type="checkbox"/> Relocation | <input type="checkbox"/> Combined Use (Residential & Commercial) |
| <input type="checkbox"/> Demolition | <input type="checkbox"/> Manufactured (Mobile) Home |
| <input type="checkbox"/> Replacement | (In Manufactured Home Park? <input type="checkbox"/> Yes) |

ESTIMATED COST OF PROJECT \$ 80,000

B. OTHER DEVELOPMENT ACTIVITIES (Check all applicable boxes):

- Clearing Grading Fill Mining Drilling
- Excavation (Except for Structural Development Checked Above)
- Watercourse Alteration (Including Dredging and Channel Modifications)
- Drainage Improvements (Including Culvert Work)
- Road, Street or Bridge Construction
- Subdivision (New or Expansion)
- Individual Water or Sewer System
- Other (Please specify)

After completing SECTION 2, APPLICANT should submit form along with site development plan to the Floodplain Administrator for review.

SECTION 3: Floodplain Determination (To be completed by the FLOODPLAIN ADMINISTRATOR)

The proposed development is located on FIRM Panel No. _____, Dated _____

The Proposed Development:

- Is **NOT** located in a Special Flood Hazard Area (Notify the applicant that the application review is complete and **NO FLOODPLAIN DEVELOPMENT PERMIT IS REQUIRED**).
 - Is partially located in the SFHA, but building/development is **not**.
 - Is located in a Special Flood Hazard Area
FIRM zone designation is _____
"1% (100 year)" flood elevation at the site is: _____ ft. NGVD (MSL) Unavailable
 - Is located in the floodway.
Panel No. _____ Dated _____
(if different from the FIRM panel and date)
 - See Section 4 for additional instructions
- Floodplain Development Permit Required Yes No

SIGNED _____ DATE _____



708 South Grove Street, Hendersonville, NC 28792
Telephone: 828.697.4884 ♦ Fax: 828.697.4886
www.hcprd.com

June 3, 2015

Jeff Ferguson, Mountain Region Engineer
North Carolina Wildlife Resources Commission
Division of Engineering Services
Weaverville, NC 28787

Subject: Agent Authorization for US64 River Access Park (boating access to French Broad River in Etowah)

Dear Jeff,

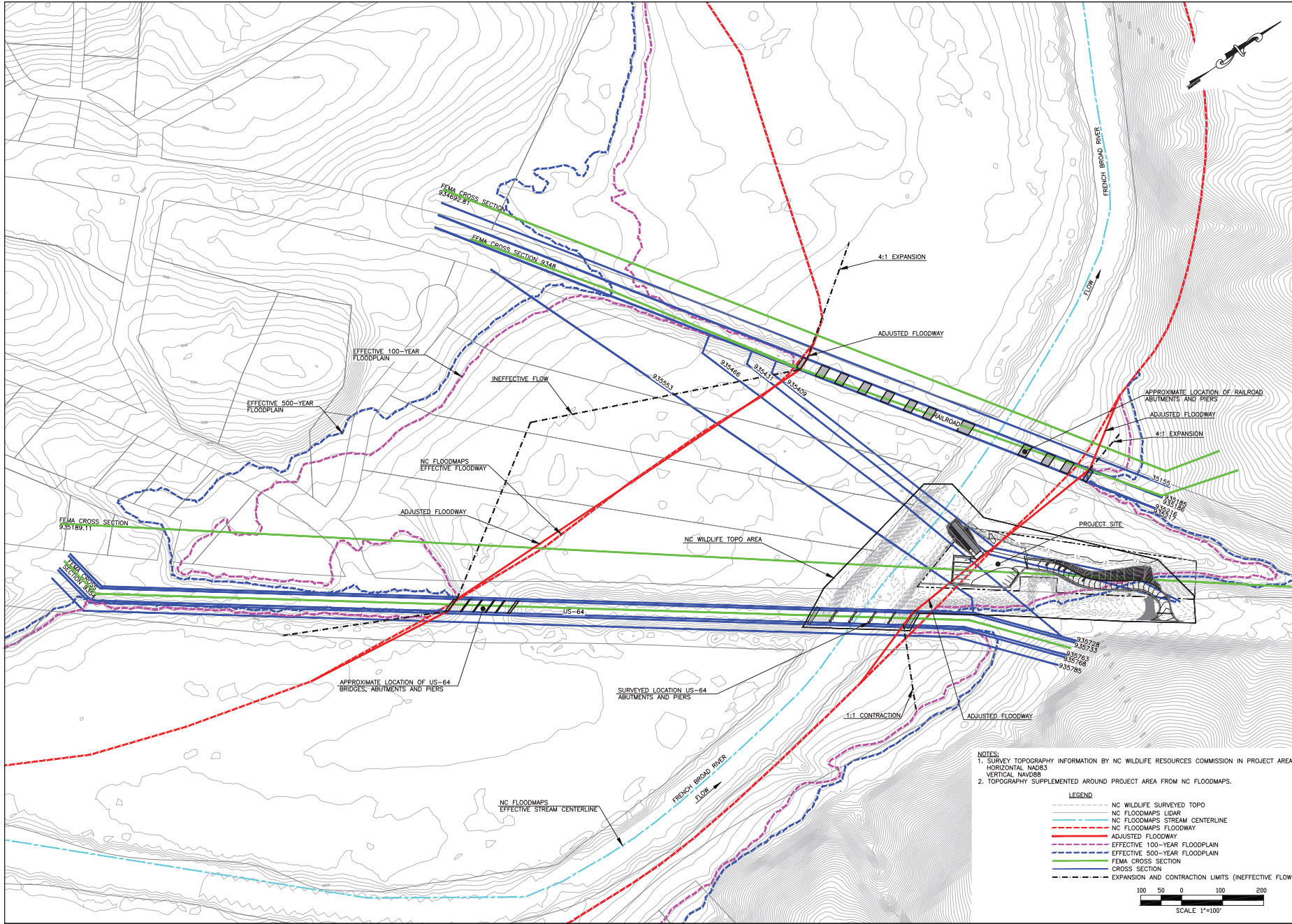
This letter is provided to serve as the "Agent Authorization Letter" to provide the NCWRC signature authority for the owner/applicant, that being Henderson County Parks and Recreation, for construction work proposed at the US64 River Access Park the French Broad River in Etowah community of Henderson County. The work includes the design, permitting and construction of the river access. Work will include an access road, parking area and boat ramp. This construction work is proposed to occur later this year. The work will provide boat launching capabilities for the general public. It is understood this work will take place after all the permits are acquired.

This authority is granted to assist the NCWRC in acquisition of necessary permits to satisfy Section 404 and/or Section 10 Nationwide, Regional and General Permits, Section 401 general Water Quality Certifications, and Riparian Buffer and Watershed Buffer Rules.

Please keep Henderson County Parks and Recreation informed with the progress of this project. Call me at 828-697-4884 if you have any questions.

Sincerely,

Timothy Hopkin, Director
Henderson County Parks and Recreation Department



NOTES:
 1. SURVEY TOPOGRAPHY INFORMATION BY NC WILDLIFE RESOURCES COMMISSION IN PROJECT AREA.
 HORIZONTAL NAD83
 VERTICAL NAVD83
 2. TOPOGRAPHY SUPPLEMENTED AROUND PROJECT AREA FROM NC FLOODMAPS.

LEGEND

- NC WILDLIFE SURVEYED TOPO
- NC FLOODMAPS LIDAR
- NC FLOODMAPS STREAM CENTERLINE
- NC FLOODMAPS FLOODWAY
- ADJUSTED FLOODWAY
- EFFECTIVE 100-YEAR FLOODPLAIN
- EFFECTIVE 500-YEAR FLOODPLAIN
- FEMA CROSS SECTION
- CROSS SECTION
- EXPANSION AND CONTRACTION LIMITS (INEFFECTIVE FLOW)

SCALE 1"=100'

100 50 0 100 200

Ward Consulting Engineers, P.C.
 FIRM LICENSE NO: C-2619
 4805 Green Rd., Suite 100
 Raleigh, NC 27616 FAX (919) 870-5359
 (919) 870-0526
 NC WILDLIFE RESOURCES COMMISSION
 ENGINEERING SERVICES
 1718 NC HWY 56 WEST
 CREEDMOOR, NORTH CAROLINA 27522



**FRENCH BROAD RIVER
 US-64 FISHING ACCESS
 FLOOD STUDY PROJECT AREA WORKMAP
 HENDERSON COUNTY, NORTH CAROLINA**

DATE: 7-2-2015

REVISIONS:

PROJECT NAME:
 FLOOD STUDY

DWG NAME:
 FLOOD STUDY AREA WORKMAP

SCALE:
 1" = 100'

SHEET NO.