

**LOCAL FLOOD ANALYSIS  
FOR THE  
EAST BRANCH/MAIN STEM OF THE NEVERSINK**



**This document was prepared for the Towns of Denning and Neversink under the supervision of the Denning Neversink Flood Advisory Committee with funding provided by Sullivan County Soil and Water Conservation District's Stream Management Program through contract with New York City Environmental Protection**

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**June 2016**

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*Engineers • Environmental Scientists • Planners • Landscape Architects*

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## **I. Statement of Purpose and Scope**

### **Purpose and Scope**

The Towns of Neversink and Denning, situated along the banks of the Neversink River, have experienced severe flooding in recent years. This has led to a heightened awareness of the damage that can occur from flooding. Residents, businesses, and other stakeholders desire to build community resilience and protect community assets from future flood damage. In order to access new funding assistance to meet those goals, a hydraulic analysis of the main population areas of Denning and Neversink is underway. As with Stream Management Planning in the New York City watershed region since 1997, this effort is funded through local County Soil & Water Conservation Districts by NYC Environmental Protection. A Committee of residents, local officials and technical staff from the funders was created to administer the Local Flood Hazard Mitigation Analysis. Those members from Town of Neversink were: Keith Stryker, Code Enforcement Officer, James Stengal, Planning Board Chair. Jim Marion served on the Committee member until he passed away in late 2014. From Denning: Mark Boncek, ZBA Chair, Bill Bruning, retired Supervisor, and currently, Greg Vurckio, a Town Council member; and Aaron Bennett from Ulster County Department of Environment.

Staff members of Sullivan County SWCD's Rondout Neversink Stream Program included Brian Brustman, Karen Rauter, Stacie Howell; from NYC DEP: Mark Vian, Phil Eskeli and Emily Smith. From Barton and Loguidice: Wendell Buckman, P.E. and Shaun McAdams.

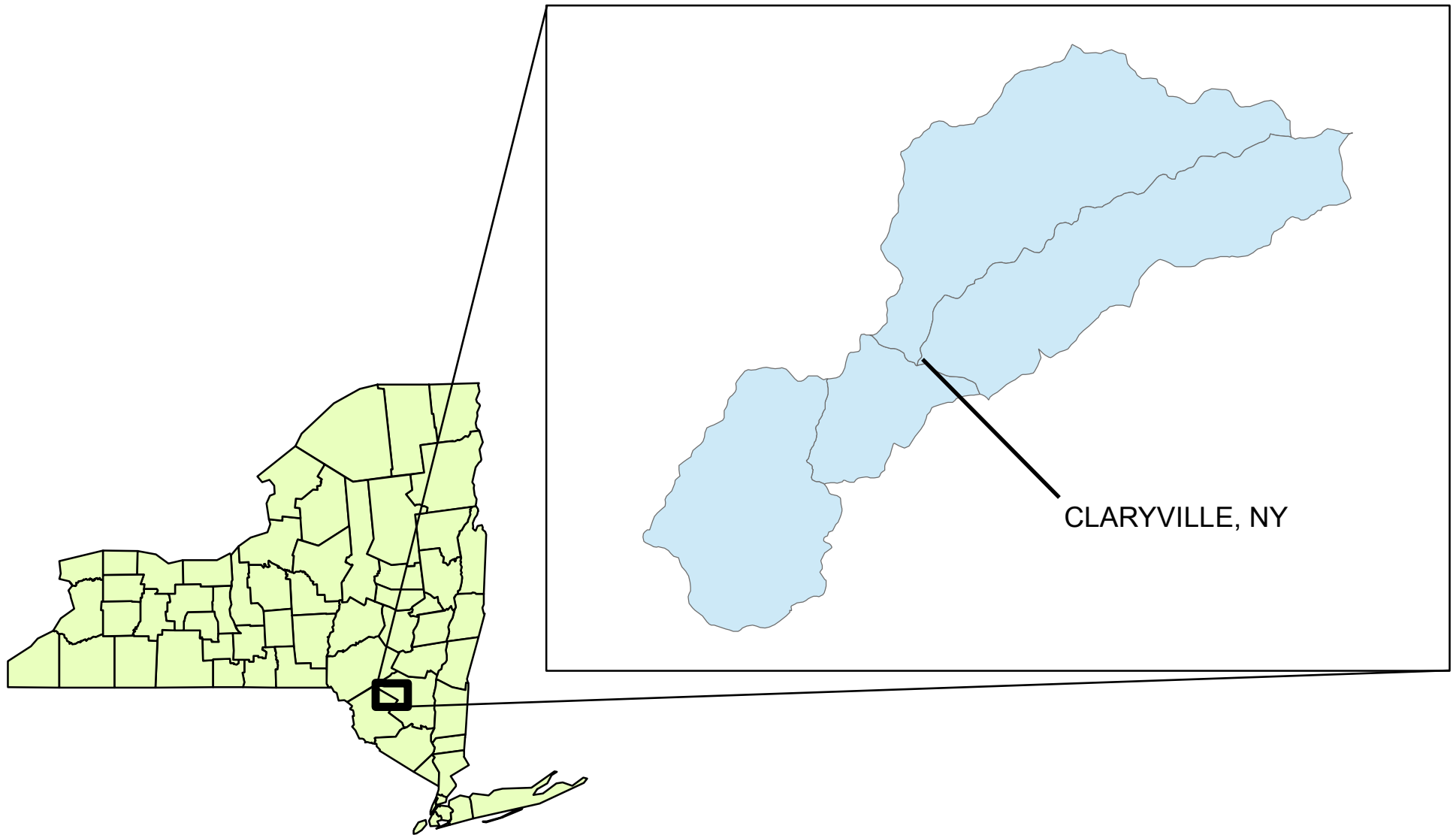
The purpose of this Local Flood Hazard Mitigation Analysis (LFA) document is to provide a detailed assessment of the flooding characteristics in the Towns of Neversink and Denning. The focus area of the analysis extends from the Denning Road bridge crossing of the East Branch of the Neversink (approximately two and a half miles upstream of the Ulster-Sullivan County line) to the confluence of the East and West Branches of the Neversink Frost Valley Road bridge; the focus area then continues on the main stem of the Neversink, approximately one half mile downstream of the Halls Mills Covered Bridge.

This LFA document describes the existing flood hazards within the focus area, identifies existing infrastructure elements in the community that are at risk for flood damage, recognizes potential alternatives aimed at reducing flood impacts, and describes an implementation plan for prioritized alternatives. The analysis is based on an initial flood study completed by FEMA, and is supported by additional field-derived data reflecting current river- and floodplain conditions. This document includes a review of available information pertinent to the hydrologic and hydraulic functions of the Neversink and engineering analysis required to assess the flooding characteristics within the focus area. In addition, reach specific stream stability restoration goals from the Upper Neversink Stream Management Plan have been included in the Appendices, as well as General Recommendations for best practices when managing the stream for flood hazard mitigation.

## II. Site Description

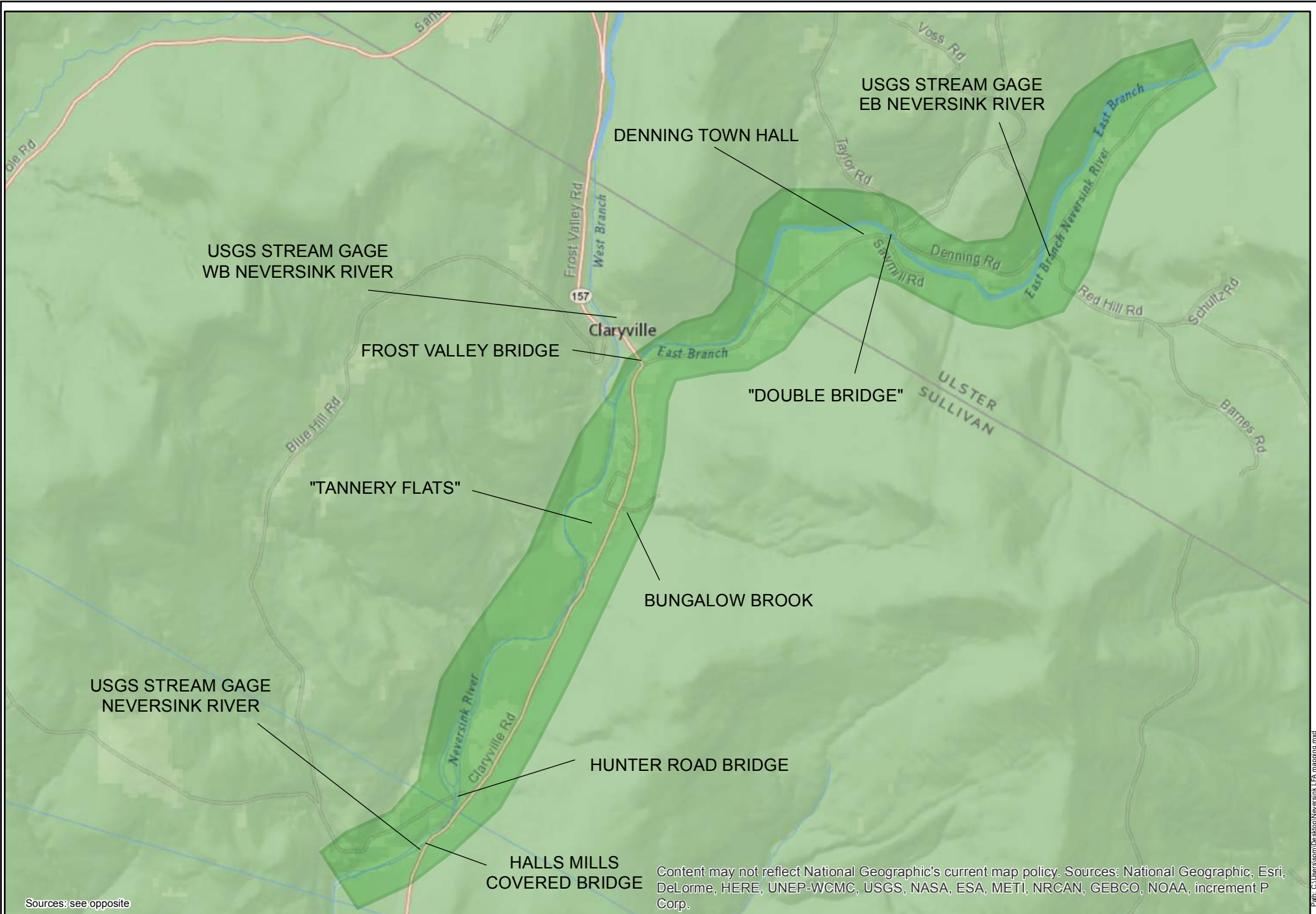
<b>County:</b>	Sullivan & Ulster Counties
<b>Village/Town:</b>	Towns of Neversink & Denning
<b>USGS Quadrangle Map:</b>	Claryville
<b>River/stream:</b>	Neversink River (East Branch & Main Stem)
<b>Stream Classification:</b>	C with (T) Standards (East Branch) B with (T) Standards (Main Stem)
<b>Focus Area Length:</b>	6.4 miles (3.5 miles of the East Branch and 2.9 miles of the Main Stem)
<b>Drainage area:</b>	The drainage area at the downstream limits of the focus area is approximately 68 square miles.
<b>Gages:</b>	There are three gaging stations in proximity to the focus area: one on the East Branch (at a Denning Road Bridge crossing); one on the West Branch Neversink at County Bridge 157 Frost Valley Road (approximately one half mile upstream of the confluence of the East and West Branches) and a third on the main stem (0.9 miles downstream of the focus area (at the Halls Mills Covered Bridge)).





Sources: Google Earth





Sources: see opposite

Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



1 inch = 3,643 feet

Path: C:\Users\gambal\Desktop\Neversink\_LFA\_mapper.mxd

### **III. Methods**

#### **III.A. Approach**

An evaluation of flooding in the Neversink watershed was developed from available information, data collected from field reconnaissance, and engineering computations. The basis for the evaluation was FEMA's hydraulic model developed in 2013 to update previous Flood Insurance Studies (FISs). FEMA's Effective Hydraulic Model was performed in the US Army Corps of Engineers' HEC-RAS software. Barton & Loguidice D.P.C. (B&L) reviewed and modified the FEMA Effective Model in order to capture the existing flood regime of the East Branch and the main stem of the Neversink River and its tributaries within the defined project area. This adapted model is referred to as the "Duplicate Model."

Using this refined model informed by existing FEMA modeling and corrected by inputs from field data and observations of the stream/floodplain network, B&L modeled a range of flood flows (1.25-, 2-, 10-, 25-, 50-, 100-, and 500-year flood events) within the project area. The outputs of these model runs graphically document flood profiles, identifying water surface (flood) elevations and lateral flood extents (inundation widths) within the project area corresponding to each flood flow. Using Geographic Information Systems (GIS), topographic mapping (supported by LiDAR-derived contour data) and aerial imagery overlays to depict inundation zones, at-risk structural elements (including residential properties, infrastructure elements, etc.) were identified for each flood stage modeled. Defining the inundation limits and affected infrastructure elements corresponding to each modeled flood stage provides the fundamental basis for identifying mitigation alternatives based upon prioritized assessment of the severity and extent of impacts associated with each modeled flood event.

One of the dominant local perceptions is that flooding through the study area is caused or exacerbated by sediment filling in the channels. In order to further understand this issue and be able to evaluate alternatives as they relate to sediment transport, B&L conducted a field-analysis to evaluate sediment transport characteristics through the project reaches of the Neversink and its East and West Branches. Methods utilized include the FLOWSED/POWERSED models (informed by empirical field data collected from 21 river sections), to evaluate both sediment

transport competence (mobilization) and capacity (conveyance) through the project reach. Findings were used to provide a comparative analysis of the sediment transport regime at various locations through the project reach, providing insight as to where imminent changes in channel form during a flood, likely caused by rapid sediment deposition, may lead to an elevated risk to infrastructure and other elements of interest. Ultimately, the findings of the sediment transport analysis will be used to evaluate opportunities where bank stabilization and channel modifications can be used in tandem to protect streamside infrastructure, properties, and resources by balancing sediment transport and reducing the risks associated with abrupt changes in channel form that often accompany flood events.

### **III.A.1 Hydrology**

The hydrology for the existing FEMA models was developed utilizing current information from the gage stations located on the East Branch and the main stem of the Neversink. The total drainage area at the downstream limits of the project area is approximately 68 square miles. There are three gaging stations in proximity to the focus area: one on the East Branch (at a Denning Road Bridge crossing); one on the West Branch Neversink at County Bridge 157 Frost Valley Road (approximately one half mile upstream of the confluence of the East and West Branches) and a third on the main stem (0.9 miles downstream of the focus area (at the Halls Mills Covered Bridge).

FEMA utilized a Log Pearson Type III statistical evaluation of historic flood elevations recorded at these gage stations to determine the peak discharges for the 10, 25, 50, 100, & 500 year flood events. Results of this evaluation were reviewed by B&L to confirm that the corresponding discharge values determined by FEMA are consistent with actual, current flood conditions. As a means of validating the FEMA gage analysis, discharge values associated with Tropical Storm Irene (2011) and the localized flood of 2012 were compared with, and found to closely mimic, those actually experienced during these events. Using FEMA's analysis of larger floods, B&L developed discharge values corresponding to the 1.25, and 2 year floods, providing a means for evaluating the river's flood- and sediment transport regimes during these smaller, more frequently-occurring events.

**Table 1 - Peak Discharges (cfs)**

Location	Recurrence Interval (years)						
	1.25	2	10	25	50	100	500
Near the Upstream Limit of Project Area							
– East Branch Neversink USGS Gage No. 01434017	1,720	2,340	4,170	5,510	6,730	8,070	11,400
WB Neversink USGS Gage No. 01434498	3,670	5,860	12,000	15,600	18,600	21,800	30,000
Downstream limits of Project Area –							
Main Stem Neversink USGS Gage No. 01435000	4,090	6,530	13,300	17,300	20,700	24,200	33,200

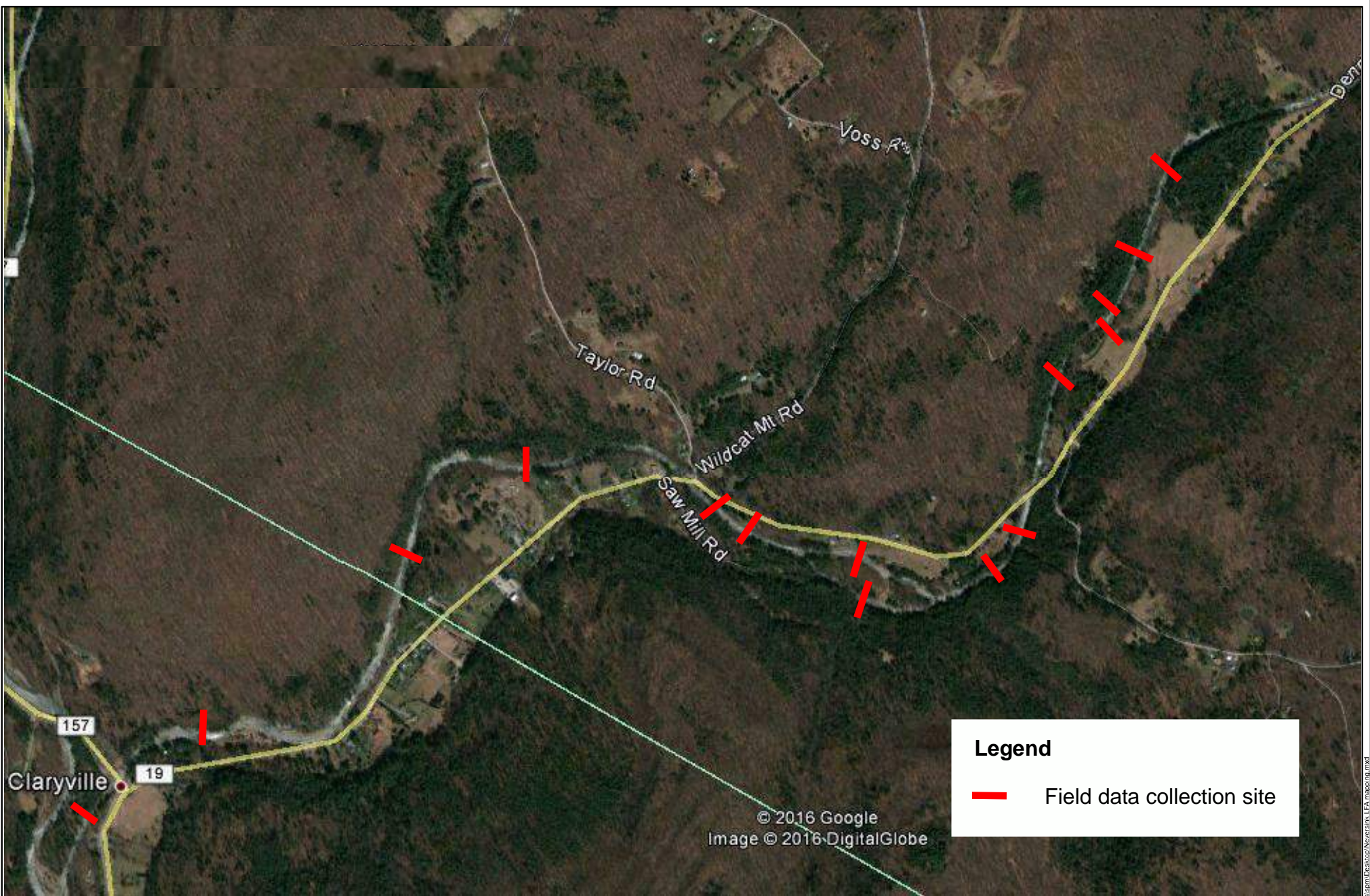
### III.A.2 Duplicate Hydraulic Model

The hydraulic assessment is used to evaluate and predict water elevations, identify flood prone areas, and evaluate mitigation strategies to minimize future flood damage and protect water quality. FEMA developed an updated hydraulic analysis for the Neversink Watershed in 2013.

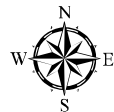
The detailed HEC-RAS model developed by FEMA for the Main Stem and East Branch of the Neversink River does not extend to the upstream limits of the study area. An approximate model extended from the detailed model past the limits of the study area. The approximate study was used and enhanced with additional data to extend the detailed HEC-RAS model to the study limits. In addition to the cross sections in the FEMA model (surveyed in 2013), an additional twenty-one (21) cross sections obtained during our sediment transport analysis were also added to the model to provide the most complete and up-to-date model possible. A detailed evaluation of the duplicate hydraulic model was completed to investigate obstructions, ineffective flows, and verify geometry throughout the model. The final step was to model the inundation limits from Tropical Storm Irene. During our initial public meeting we gathered information regarding what was actually observed during the event and compared this to our model. This provided us with a real-world calibration of the model. The end result was our existing conditions “Duplicate Effective Model” that was used to compare potential mitigation alternatives.

### **III.B. Field Reconnaissance**

Field data was collected from 21 locations along the main stem and East Branch of the Neversink River. Field data collected at each location included an analysis of prevailing sediment particle size distributions in the river's bed (pebble counts) and adjoining depositional gravel bars (bar samples). Cross sections and longitudinal profiles of the river channel were surveyed at each location to inform hydraulic conditions at each sampling location. This information was used to evaluate the effectiveness of the river at various points to transport sediment (gravel) when in flood.



Sources: Google Earth




Path: C:\Users\spain\Desktop\Neversink LEA.mxd

4/11/2010



**Legend**

 Field data collection site

Sources: Google Earth



PHOTO COURTESY

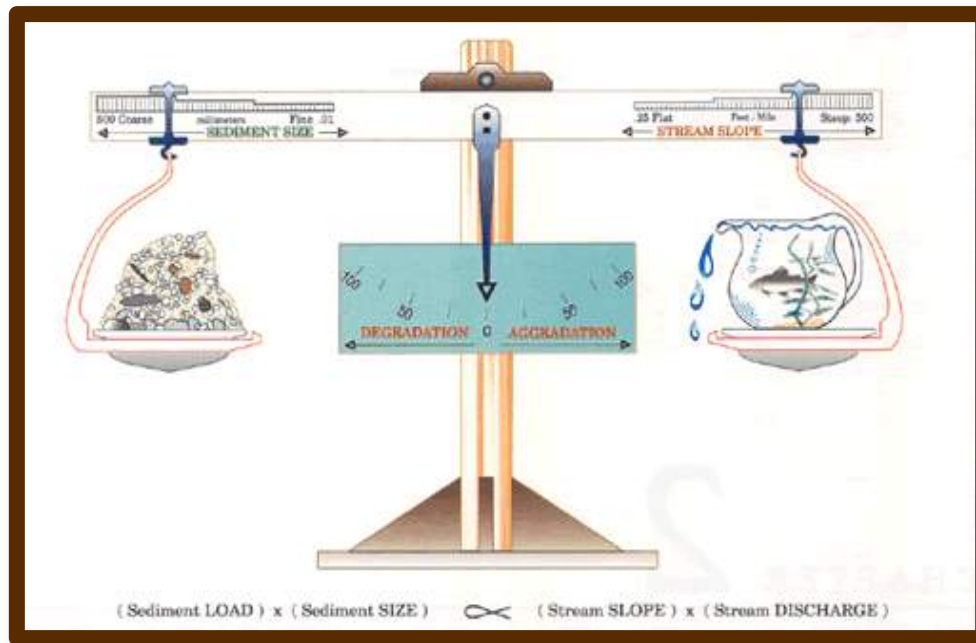


### III.C. Sediment Transport Modeling

Field data collected from 21 study locations along the East Branch and main stem was utilized to evaluate sediment transport through the project reach, both in terms of competence (the ability of the river to mobilize the available sediment from a static state) and capacity (or the ability of the river to convey the available sediment load once mobilized).

Competence is evaluated through comparative analysis of the relationship between the composition of the prevailing river substrate (bed material) and the force exerted upon those sediment particles by the action of water flowing along the river channel (shear stress). As shear stress increases, the size of sediment particle able to be mobilized by the flow also increases. In the most general of terms, by comparing the shear stress at each study location (derived from the surveyed cross section and longitudinal profile) to the sediment particle size distribution of the river bed at that site, a determination is made as to whether the shear stress exerted on the bed is greater than, less than, or relatively equal to that required to mobilize the sediment available.

At locations where shear stress significantly exceeds that required to mobilize the sediment, the river is said to be *over-competent*, and bed scour will occur. This can lead to the channel becoming deeper and, eventually, to bank collapse. Conversely, in scenarios where shear stress is less than that required to mobilize sediment, aggrading conditions (sediment deposition) will result. This can lead to a channel that is filled with sediment, leading to higher inundation levels and channel migration as the river seeks flow routes around the obstructions. A stable river section, which mobilizes the available sediment load without excessive scour or deposition, maintains a relative balance between available shear stress and that necessary to mobilize sediment particles comprising the river bed.



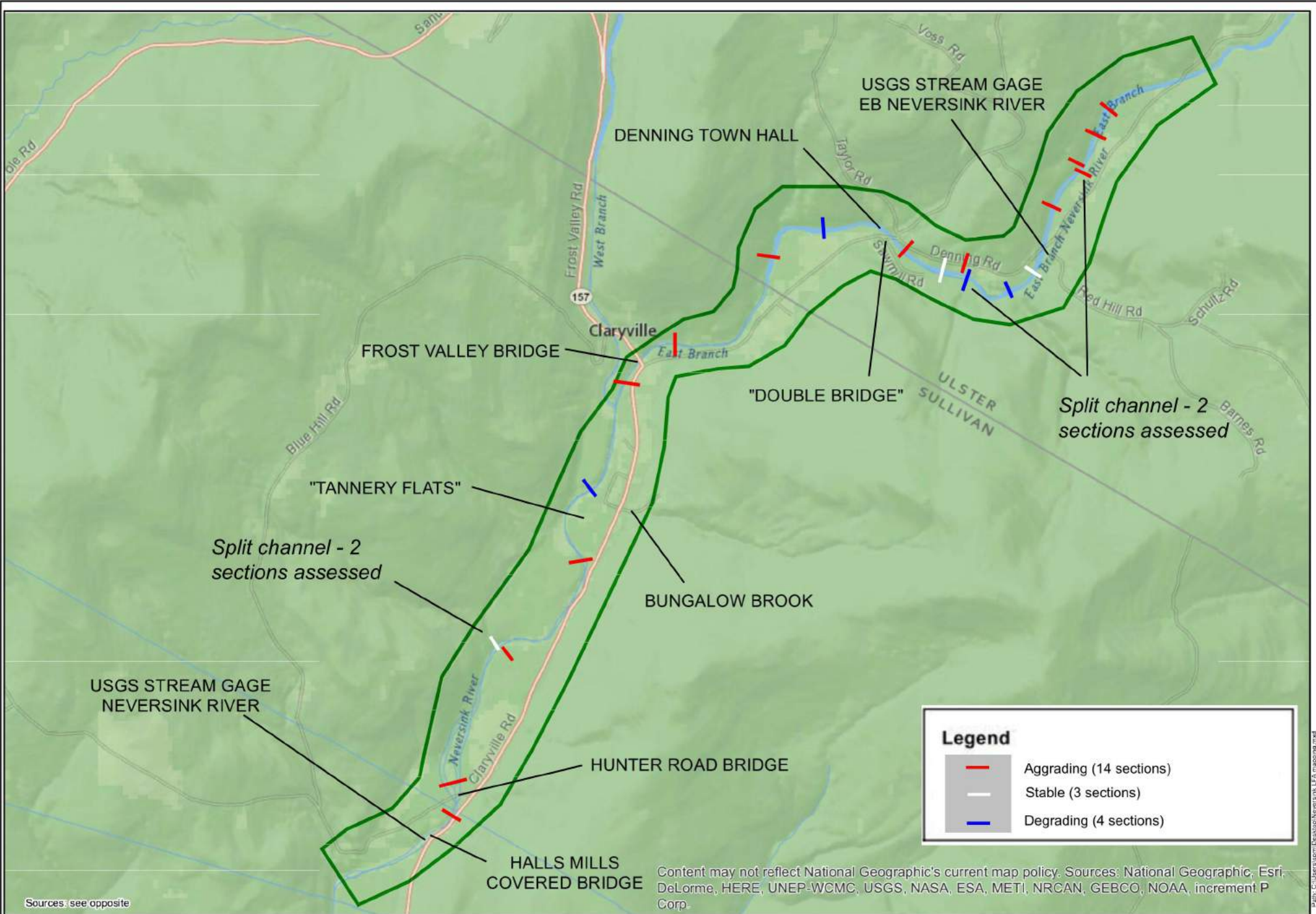
*Image courtesy: Dave Rosgen (Wildland Hydrology)*

Transport capacity describes the river's ability to pass (convey) the volume of sediment coming from upstream through a given channel section. The FLOWSED / POWERSED model was utilized to evaluate sediment capacity at each study location, by comparing channel hydraulics of the study section to those of a representative 'stable' river section. Reference sediment rating curves were used to establish sediment transport rates for each section, based upon the overall condition of the contributing upstream reach and the anticipated volume of sediment derived from adjoin stream reaches of 'Good/Fair' versus 'Poor' condition (in terms of bed and bank stability). Similar to the evaluation of competence, those sections which exhibit excess transport capacity (are able to convey more sediment than that delivered from upstream) tend to degrade (scour), whereas those that lack sufficient capacity tend to deposit sediment and aggrade. A stable river section has sufficient capacity to both mobilize and convey the sediment load without aggrading or degrading. This model is used to assess the current transport capacity and whether the stream is likely to aggrade or degrade from incoming sediment in the next bed mobilizing event. It does not specifically tell us if, and to what degree, the channel has aggraded or degraded in the past, which can only be assessed through repeat channel surveys.

Results of the sediment transport analysis revealed the following trends along the course of the East Branch and main stem within the project area:

- Of 15 study sections along the East Branch:
  - 10 locations were determined to be actively aggrading (depositing excess sediment)
  - 3 were found to be degrading
  - 2 were determined to be relatively stable
- Of 6 study sections along the main stem Neversink:
  - 4 locations are aggrading
  - 1 exhibits degrading conditions
  - 1 was determined to be relatively stable

Determination of aggrading conditions at 14 of 21 locations along the East Branch and main stem supports the general consensus of the community that the river, over time, has been filling with sediment. This is partly due to the existing hydraulic conditions in various places in the river—including backwater conditions caused by bridge spans at the numerous road crossings that restrict the river at higher flows--and partly due to a high supply of sediment coming from stream bank and hillslope erosion, both within the study area and from upstream watersheds. Although measures to manage sediment sources are not specifically included in this LFA program, ongoing efforts by the Rondout/Neversink Stream Management Program are specifically aimed at treating bank and hillslope erosion, and will reduce the excessive sediment loading to the Neversink system.



Sources: see opposite

Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

### III.D. Public Outreach

A series of public presentatons were held to gain input and share information with the community members during the process of conducting the analysis. The meetings were structured as follows:

- *Meeting #1* – This meeting was used to inform the community of the LFA process. We also utilized this meeting to verify the existing HEC-RAS model. To do this we showed the residents the inundation developed by Irene in our model and compared it to what the public actually experienced during the storm.
- *Meeting #2/3* – We presented our alternative modeling to the public and the results of modeling and used the opportunity further educate on the functionality of the model and its benefits as a tool for planning. River process, river stability, and sediment transport concepts were also presented, as well as the distinction between natural stream channel design and traditional dredging.
- *Meeting #4* – This meeting was used to present the results of the BCA and to discuss the limitations they pose to implementing proposed solutions that were modelled.
- *Town Board Meetings* – Once accepted by the Town Boards, the Local Flood Analysis will serve to make them eligible for future funding opportunities available within the NYC watershed region.

## IV. Flood Mitigation

### IV.A. General

As shown through the modeling and historic events, the studied project reach (East Branch and Main Stem of the Neversink in the Claryville area) is susceptible to flooding during large storm events. Alternatives for mitigation alternatives are characterized under the following categories:

- **Property Protection:** These types of alternatives include measures that either provide structural measures to protect existing buildings, residences, and infrastructure elements from flood impacts, such as flood levees, diversions, floodwalls, etc., or to remove them from the flood inundation zone through raising building elevations, relocation, or abandonment of properties.
- **Flood Damage Protection and Planning:** These types of alternatives include stream and/or floodplain modifications intended to reduce flood elevations. These approaches are *oftentimes, but not entirely*, most applicable in areas where sufficient lateral area adjacent to the active channel and floodplain are available to implement such measures. In addition to reduction in flood risk and associated hazards, these alternatives, including such measures as floodplain reconnection, installation and protection of streamside buffers, and natural channel restoration, provide a wide range of additional benefits to the community. Benefits include improved aesthetics, recreational opportunities, water quality, and elevated property values. When compared to more structurally-engineered alternatives, these modifications provide greater flood mitigation benefits to the system as a whole by reducing flood velocities, reducing bank erosion and mass failures, and minimizing changes in channel form upstream and downstream by balancing the sediment transport regime. Funding sources such as Catskill Watershed Corporation (CWC) are available to support flood mitigation projects that incorporate approaches such as natural channel and/or floodplain restoration.

- **Natural Resource Protection:** These types of alternatives do not directly address flood stages or direct flood impacts, but instead address elements that frequently contribute to or exacerbate flood elevations. They include: debris blockages at culverts and bridges; bed-load, large woody debris; bank stabilization; and landslide remediation. These approaches can also include out-of-channel projects intended to restore the natural hydrologic regime through increasing groundwater infiltration, stormwater detention and storage, and reducing flood surges associated with excessive overland runoff. Rondout Neversink Stream Program through Sullivan County SWCD is a potential source for funding these multi-purpose restoration projects.
- **Structural Projects:** These types of alternatives provide structural protection to critical infrastructure elements, such as utilities, bridges, roadway embankments, and culverts. Because of the localized nature of many of these types of projects, these approaches are best implemented in conjunction with one or more additional mitigation alternative approaches, such as replacing, retrofitting, or re-sizing bridges and culverts, etc.
- **Emergency Response and Services:** These types of alternatives do not directly address flood impacts, per se, but establish adequate response measures from Emergency Services agencies to provide affected residents with safety, shelter, and adequate supplies to offset the impacts to health, personal safety, and impacts to quality of life that result from flood events.
- **Community Pollution Prevention:** These types of alternatives identify and secure, either through structural, relocation, or other means, elements within the community that pose potential pollution and/or toxic risks to people, property, and the environment when inundated during a flood.

The alternatives evaluated by the hydraulic model below largely focus on structural and flood damage protection through projects that reduce flood elevations and subsequent impacts to structures and roadways. The alternatives evaluated are presented starting upstream and working downstream through the project area but in no order of importance or priority.

## **IV.B. Areas of Interest**

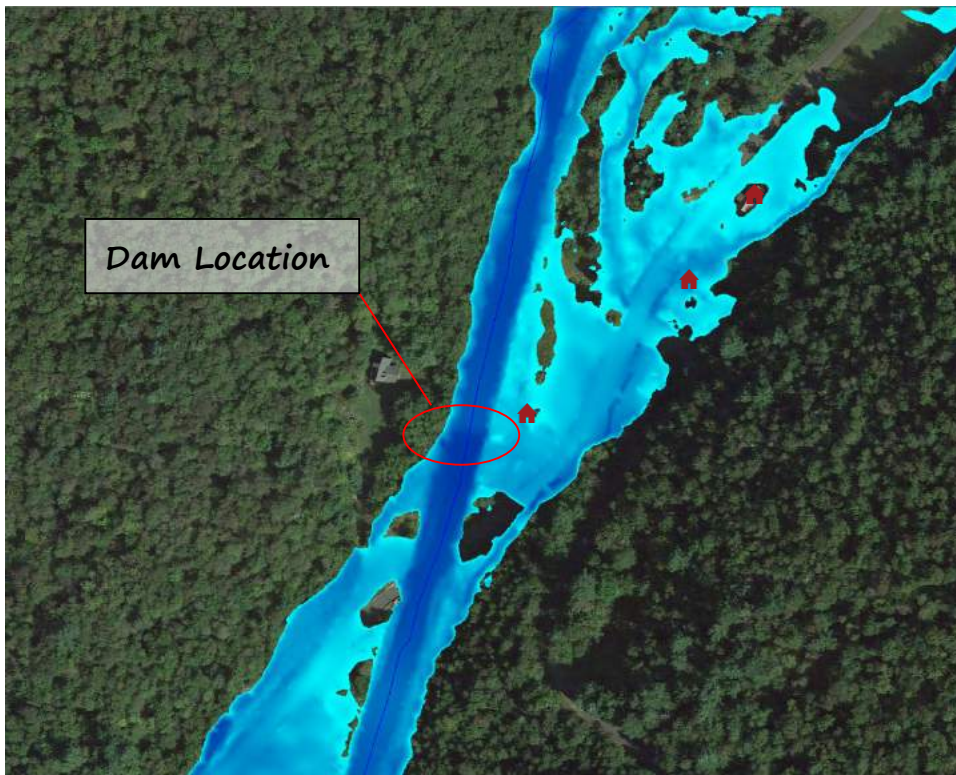
### **IV.B.1 Denning Road Dam near Red Hill Road**



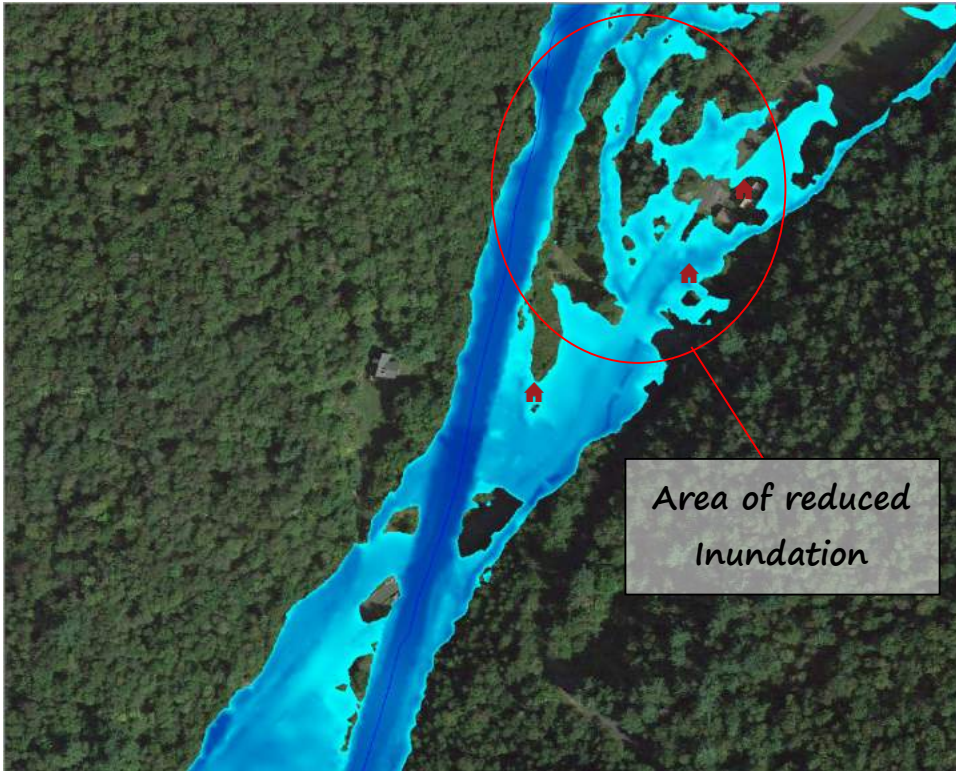
The small private dam that crosses the East Branch of the Neversink just upstream from the Denning Road Bridge near the intersection with Red Hill Road was identified as a potential contributor to flooding. The influence of the dam on flooding in the area was unknown. To fully compare the effects of the dam, an alternative was developed that removed the dam entirely. The alternative restored the grade of the channel. The reduction of flood elevations was approximately 0.5 ft for storms with a recurrence interval larger than 10-years. The influence of the removal was only observed approximately 700-800 feet upstream. This impacts the owner of the dam and 2 other houses upstream and across the road. Refer to Appendix A for the reduction in water surface elevations at each of the houses impacted.



While there is localized benefit from this alternative, it would not provide widespread benefits throughout the project area. The current owner of the dam was present for the presentation during which the model was discussed and though he did not return to see the results of the model at the later meeting, his desire to retain the dam in place was noted. Following Irene, he made an investment to repair the dam and expand on the stone walls intended to protect the driveway which has suffered repeated flood damage.



*Figure 6 - Inundation Area during a 10 year event – Existing Conditions*



*Figure 7 - Inundation Area during a 10 year event – Proposed Conditions*

**IV.B.2 “Double Bridge” at Town Hall**

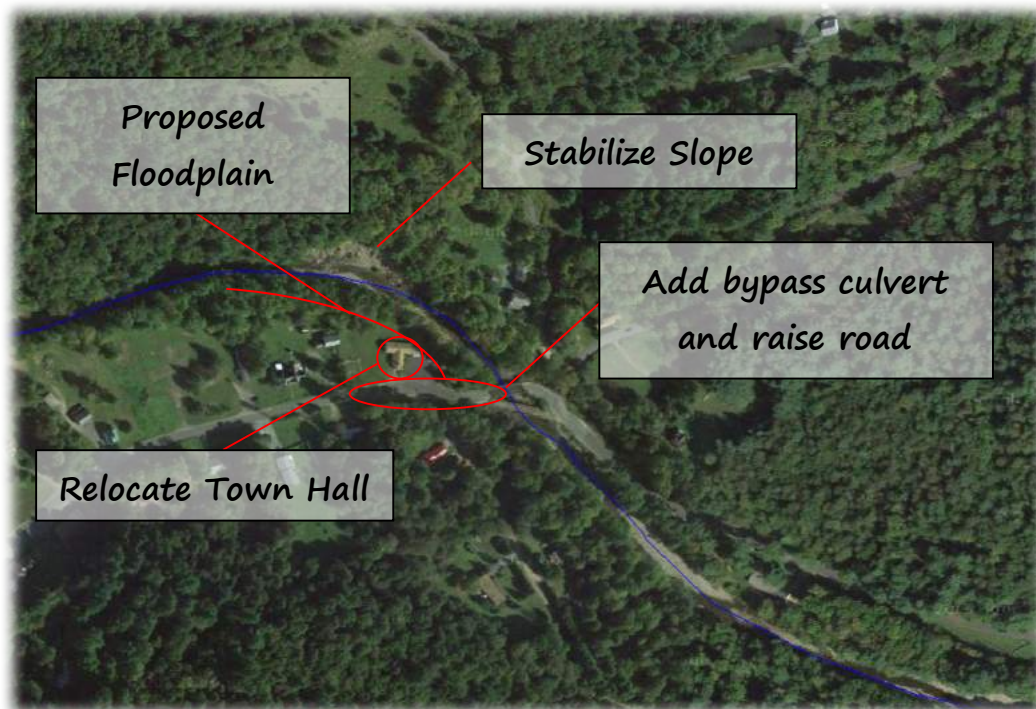


The influence of the existing truss bridge and the temporary bridge installed next to it was identified as a potential constriction along the East Branch of the Neversink. The presence of two bridges aligned at different orientations presented a location where a significant amount of energy was lost in the model resulting in backwater elevations upstream. The bridge was slated for replacement in 2015 and an initial concern was the size of the bridge being proposed by Ulster County. The replacement bridge being constructed by the County was modeled compared to the existing two bridge condition:

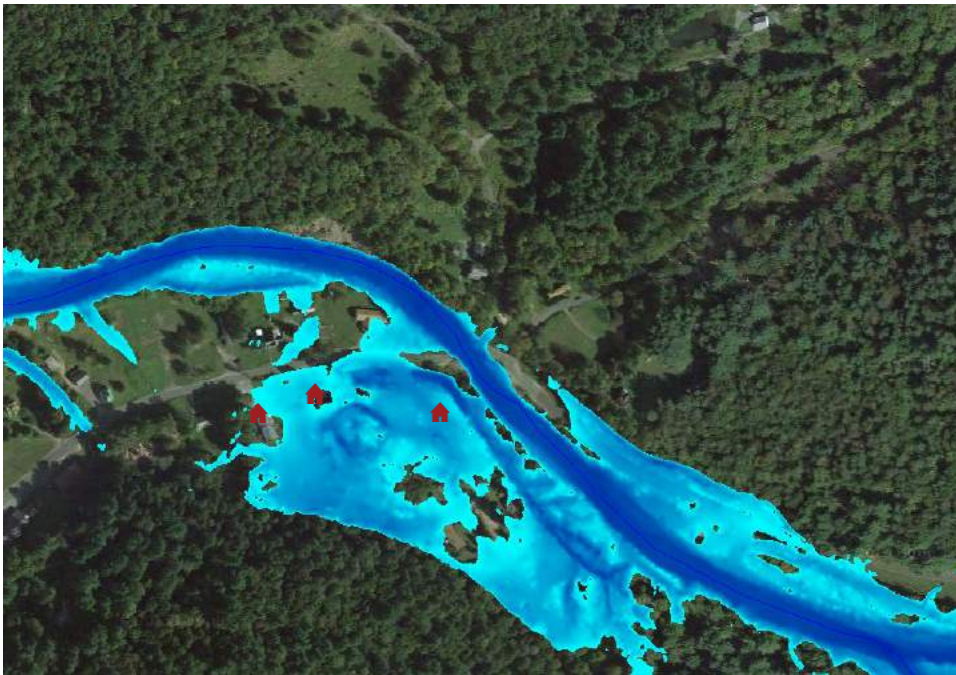
Flow	Existing WSE (ft)	Proposed WSE (ft)
1.25-yr storm	1695.07	1694.94
2-yr storm	1696.22	1695.88
10-yr storm	1698.63	1697.83
25-yr storm	1699.92	1698.83
50-yr storm	1700.58	1699.43
100-yr storm	1701.30	1700.05
500-yr storm	1700.58	1701.55

The proposed low beam elevation of the new bridge is 1699.84. The improved opening results in backwater elevations that are reduced by approximately 1 foot for the larger storms. The freeboard, or distance between the low beam and the water surface, for the 50-year storm is 0.4 feet. A storm between the 25- and 50-yr flows would inundate the approach roadway southwest of the bridge. It appears that the flow is getting over to Saw Mill Road at an upstream cross section which is inundating the southwest approach. The berm upstream of the bridge in the left floodplain is overtopped between the 25 and 50-year storms.

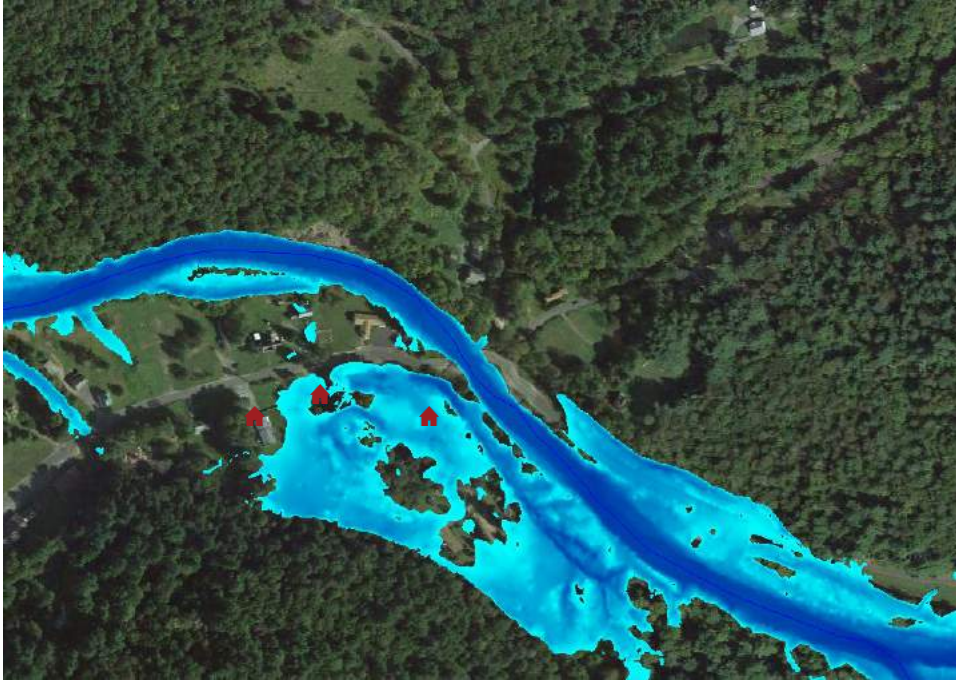
The concept of a detention pond was briefly discussed, but was determined not to be feasible given the volume of flow that comes down the East Branch of the Neversink. For example a 2-3 acre detention pond would fill in a matter of minutes during a 10-year storm event. Once the detention pond is filled, it would offer no reduction in peak discharges. This concept was not explored further.



While the model showed that conditions are improved with the proposed bridge design, there is still flooding along the south approach. This flooding is what shuts down the road to vehicular traffic and results in water traveling down Denning Road towards the center of Claryville. To address this issue, an option to raise the road out of the floodplain was evaluated. This was combined with 1) a 60foot long bypass culvert to carry under Denning Road the water coming from Saw Mill Road when higher flows overtopped the berms, and 2) stream channel modifications downstream of the bridge, including a 100 foot wide floodplain bench along the south bank of the river where the Town Hall currently sits, and a smaller bench in front of the failed slope along the north bank to mitigate erosion. This last treatment would also reduce velocities at the toe of the failed slope, allowing the bank to be stabilized. In order to accommodate the floodplain bench downstream of Denning Road, the Town Hall would have to be relocated to facilitate this project. While a major project, this reduces flood elevations significantly and reduces the risk for several houses in this segment for floods with a recurrence interval greater than 50 years. Refer to Appendix A for the reduction in water surface elevations at each of the houses impacted.



*Figure 8 - Inundation Area during a 25 year event – Existing Conditions*



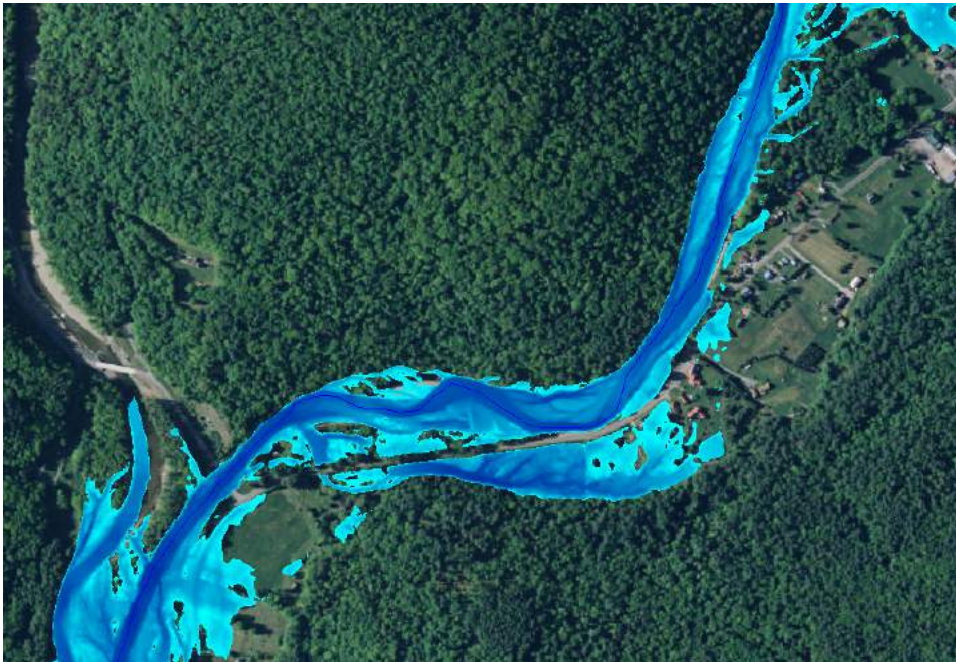
*Figure 9 - Inundation Area during a 25 year event – Proposed Conditions*

### IV.B.3 DOT Stacked Stone Wall DS of County Line/”Wellington Site”



The area of concern is a 2600 foot length of stream beginning just upstream of the DOT stacked stone wall on Sullivan County Road 19 to a point just upstream of the Frost Valley Road Bridge. This reach of the stream was identified for several concerning features. The wall itself is being eroded along the toe, the stream is overly wide and braided, and appears to have experienced significant aggradation. In addition, this site was previously dredged following Tropical Storm Irene and the section along the stacked rock wall partially restored before being significantly reworked again by the September 2012 flood. The alternative evaluated at this site would reestablish the channel dimensions of the stream utilizing the data collected through the sediment transport model and the principles of natural channel design. By establishing the correct channel dimensions, there are three primary benefits. 1) The stream’s ability to transport the gravel is brought into balance with what is delivered from upstream. This prevents the large scale aggradation of material that is currently observed at this location. 2) By establishing a channel form that is in balance, the stream becomes more stable. This

means that the large migrations of the stream from one bank to the other will be less likely to occur. There will be floodplain area between the DOT wall along Denning Road and the stream. This floodplain area will provide conveyance during larger storms reducing the impact to properties and stabilizing the toe in front of the DOT wall. 3) The development of a natural channel section and improved stream slope results in the reduction of water surface elevations in this reach. The benefits of this project help meet multiple objectives. By stabilizing the stream, not only can a decrease in water surface elevations be achieved, but the volatility of the stream in this stretch is reduced leading to a more sustainable solution than traditional dredging and bank stabilization approaches. Refer to Appendix A for the reduction in water surface elevations at each of the houses impacted.



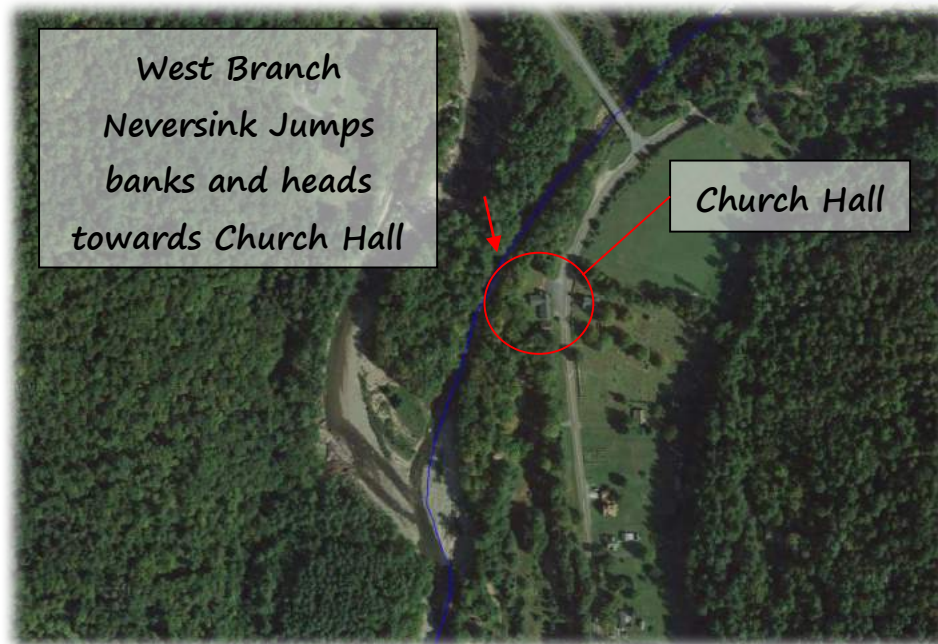
*Figure 10 - Inundation Area during a 25 year event – Existing Conditions*





*Figure 11 - Inundation Area during a 25 year event – Proposed Conditions*

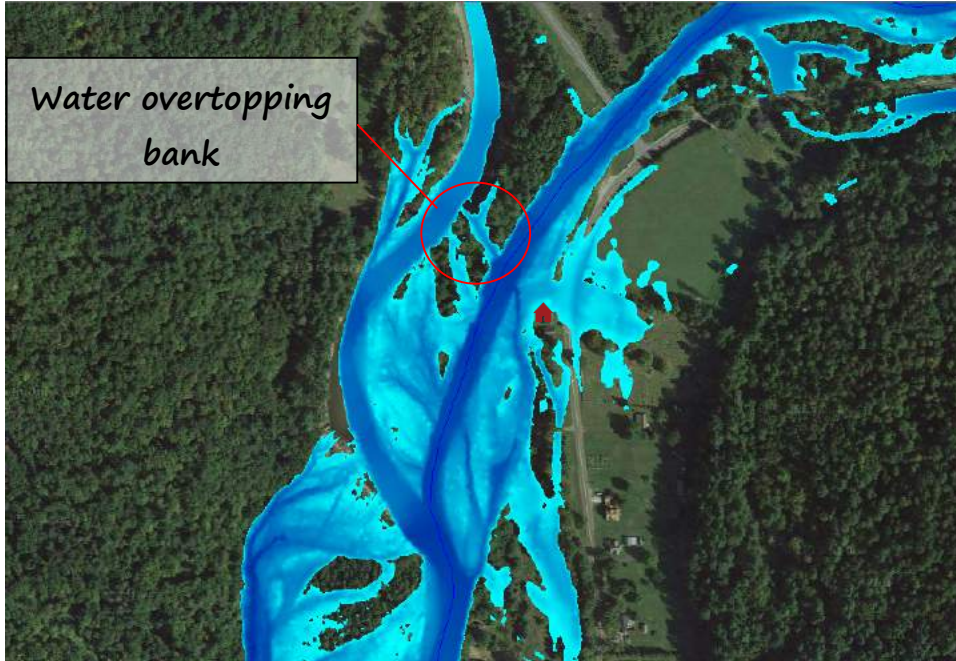
#### IV.B.4 Church Hall/Downstream of Frost Valley Bridge



The area of concern begins downstream of the Frost Valley Road Bridge and upstream of the confluence of the East and West Branches of the Neversink. Here, during large storm events, the West Branch of the Neversink River breaches the divide between the two branches, and partially spills into the East Branch channel before the true junction. The additional volume of flow in the East Branch channel potentially raises flood elevations at the church hall and in the floodplain downstream. An alternative was evaluated that looks at increasing the height of the “peninsula” between the two branches until the true junction about 750 feet downstream of the church hall. This would prevent flow from the West Branch of the Neversink from jumping into the East Branch until the true confluence. This alternative provides localized benefit to the church hall and adjacent buildings. Flood elevations are reduced by over 1 foot in the area immediately adjacent to the channel for all storms over the 10-year. Due to the localized nature of the benefits, another option at this location would be raising church hall above flood elevation.

This area contains a side channel from the West Branch to the East Branch, which currently takes water in discharges of lower recurrence intervals (2yr+). Assessing the

risk of this hazard is beyond the scope of this project and the software capabilities of HEC-RAS, but if a large avulsion occurs it would most likely present both an erosion and inundation hazard for the Claryville Church Hall. It is recommended that an engineered channel plug reinforced with large stone be placed at the downstream end of this channel to prevent the channel from conveying flow, and encourage deposition of sediment within the channel.

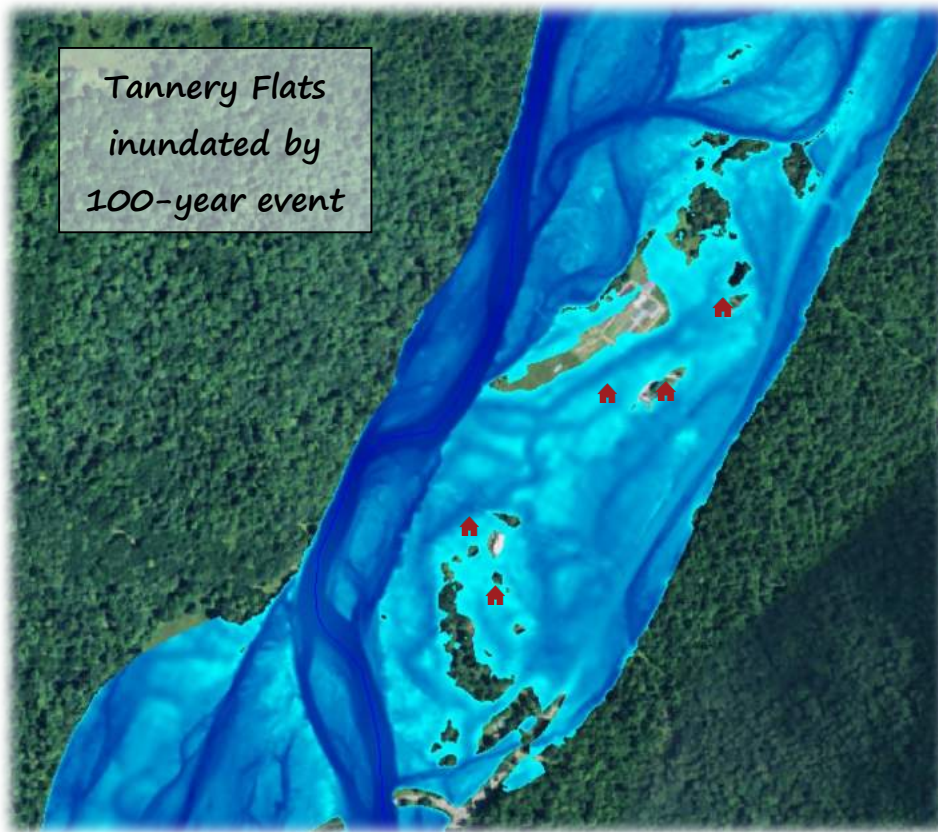


*Figure 12 - Inundation Area during a 10 year event – Existing Conditions*



*Figure 13 - Inundation Area during a 10 year event – Proposed Conditions*

#### IV.B.5 Tannery Flats



The Tannery Flats area is generally low lying and either in or immediately adjacent to the historic floodplain. One option that was considered at this location was to utilize existing cutoff channels to improve conveyance. This option explored enlarging one of the channels to a 50' bottom width, set at approximately the 1.25 year. A decrease in flood elevations of 0.1-0.2 feet was seen for the 50 & 100 year storms only in the vicinity of the improved channel itself. No additional benefit was observed upstream or downstream. The reason this overflow channel provides little benefit is that, during flood flows, the area at the outlet of the proposed channel is already in flood stage, and there is no place for the arriving water to go. Regardless of the size of the channel created, the conveyance through the Tannery Flats area is restricted by flooding already occurring at the downstream end of the flats.

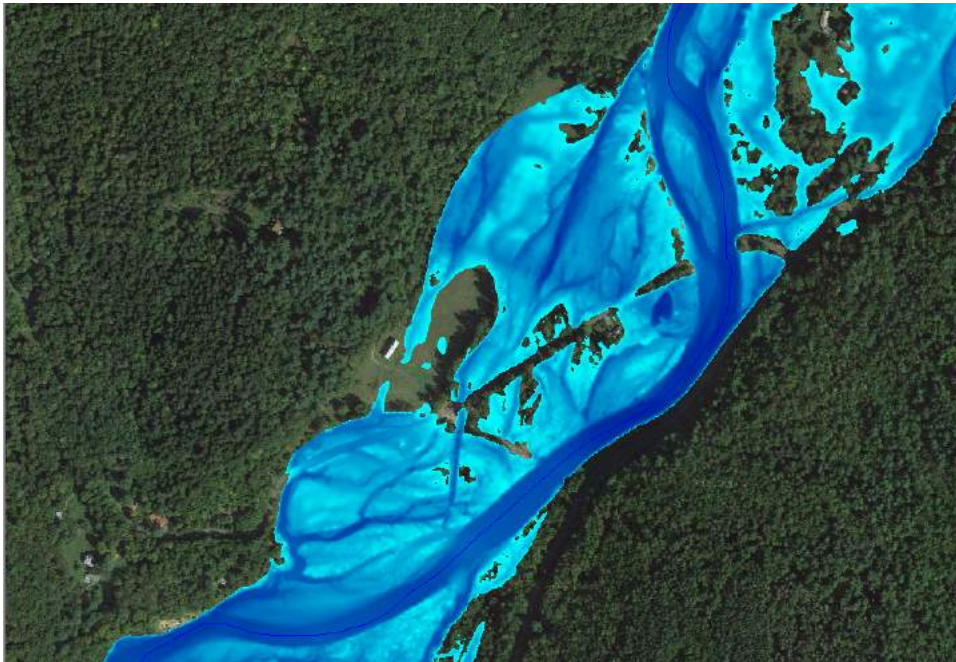
Given the limited benefits of the first option, the preferred solution at this location would likely be elevating the first floor of the houses above the 100-year flood elevation. Some of the houses in the Tannery Flats area are located above this elevation and these houses have not experienced the damage of the houses with first floors at lower elevations. To get above the 100-year flood elevation, houses would have to be raised by approximately 1.5 feet.

#### IV.B.6 Hunter Road and Hunter Road Bridge

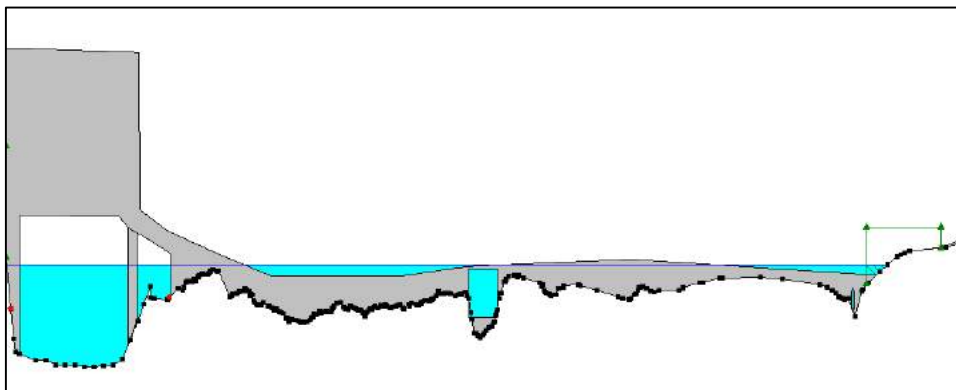


Hunter Road crosses the main stem of the Neversink River on a 196 foot long 2 span bridge, and then parallels the river through the floodplain for a distance of 1900 feet before turning west and up the valley wall. At the low point in the road, a culvert carries floodplain back-channel flows from north to south under the road in to a wetland on the south side of the road. Flood at this location resulted in a fatality in 2010 when a motorist entered the flooded roadway and was swept downstream. Our model indicates that Hunter Road is overtopped in events below the 10-year storm. Due to the volume water flowing across the floodplain, simply increasing the size of the existing culvert crossing near the spur to the covered bridge would not prevent the roadway from overtopping. To prevent roadway inundation, the roadway must be raised in excess of 3 feet in some low areas. A detailed survey of the roadway would be required to verify the quantities and locations of fill. Increasing the roadway elevation, adding a series of four 6 foot culverts and increasing the size of the existing culverts from 30 feet to 40 feet and 3 feet to 10 feet could raise the road above the 100-yr flood elevation, while avoiding an increase in flood elevations upstream or downstream while. Refer to Appendix A for the reduction in water surface elevations at each of the properties impacted. The estimated project cost would be approximately \$2.5M. To clarify potential regulatory limitations,

impacts on protected wetlands down-valley of Hunter Road would also have to be evaluated.

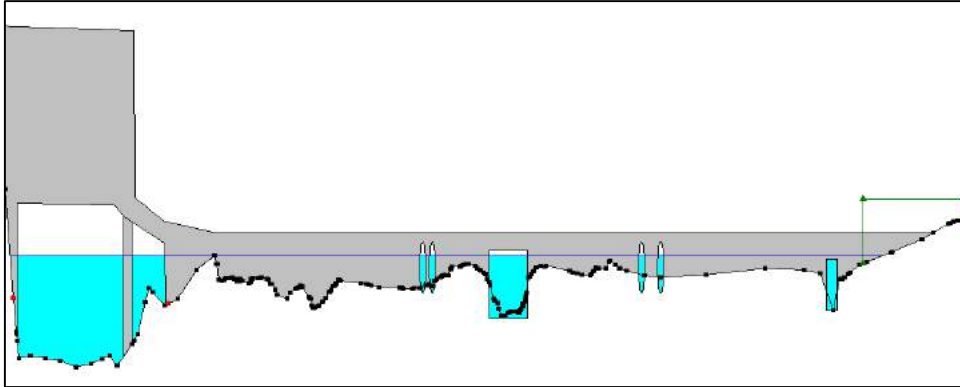


*Figure 14 - Inundation Area during a 25 year event – Existing Conditions*



*Figure 15 – Existing Road crossing showing covered bridge and 2 existing culverts*





*Figure 16 – Proposed raised road with additional floodplain conveyance under road*

Given the magnitude of a permanent solution, the interim improvement of a warning system may be the best action to take immediately until a more permanent solution can be fully developed and implemented. This could be as simple as a traffic sign warning of potential flooding ahead or be scaled to more sophisticated systems with flashing lights triggered by water levels as they start to encroach on the roadway.



#### IV.B.7 Claryville Road near Hunter Road Bridge



Claryville Road just north of its intersection with Hunter Road floods during storm events. During our public outreach, the option of raising Hunter Road at this location a sufficient amount to raise it above the floodplain was suggested. In order to raise Hunter Road above the 100-year event, it would require raising the road by as much as three feet at the lowest area. Since Claryville Road is at the edge of the floodplain, raising the road had no impact on flood elevations. The limiting consideration with this alternative is the scale of the project. To accomplish the elevation goal, Claryville Road would be reconstructed for 2/3 of a mile and raised in elevation by as much as 3 feet. This would lead to Right-of-Way concerns, driveway impacts, and impacts to local drainage such as roadside ditches.

#### **IV.B.8 Fire Hall Culvert/Hillside Runoff**

Flow from the hillside behind the Claryville Fire Hall is carried by a swale through a culvert under Denning Road immediately up valley of the fire house. During Hurricane Irene, water backed up behind the culvert and overtopped Denning Road, causing damage to the fire hall. During the storm cleanup, the damaged culvert was replaced with a larger structure. This larger culvert was modeled utilizing a TR-55 and HY-8 analysis to determine if the culvert was still undersized. The current culvert was shown to have adequate capacity to prevent overtopping of the road and meets all NYSDOT requirements for culverts. Therefore no further modifications are proposed at this location.

**IV.B.9 Bungalow Brook at Claryville Road**



Flooding has been observed by the community at the location where Bungalow Brook crosses through a culvert under Claryville Road. The flooding in the Bungalow Brook area appears to be caused by flow from Bungalow Brook backing up at Claryville Road. The drainage area at the culvert is approximately the same as the Winnisook gage further upstream on the Neversink River. The gage information was determined to be a good representative of the peak flows in Bungalow Brook and the values from the gage station were used directly in the analysis.

2-year	142 cfs
10-year	266 cfs
50-year	498 cfs
100-year	652 cfs

A HY-8 culvert analysis was run on the current capacity of the culvert which is approximately 3 feet high x 20 feet wide. The original structure is closer to a 5 foot high opening, but has filled in with sediment restricting the effective opening. In its current state, the roadway is overtopped by approximately 4 inches during a 50-year storm and 7 inches during the 100-year storm. Removing the debris would allow the culvert to pass the 50-year storm as designed and the 100-year event would overtop by 2 inches.

Research was completed by the Rondout Neversink Stream Program and it was determined that some maintenance had previously been performed on the culvert to maintain the opening. Through the mid 1990s the culvert remained clear of debris and functioned better than it currently is. It is recommended to provide the model to the Sullivan County DPW to persuade them to clear the current sediment from the culvert and establish a clear bottom. The Stream Program will perform further assessment of Bungalow Brook upstream and downstream of the culvert to determine whether a stream restoration will be useful in that setting to aim for a self-maintaining culvert; or if geology has changed significantly enough since the 1990s for that to be an unsustainable goal.



*Historic Photo of Culvert Circa 1990*

#### **IV.B.10 Debris Blockage at Bridges**

A general comment was made during the public meetings regarding the presence of debris in the channel obstructing flow, particularly at bridges. To present a representative model of the effects of debris obstructions at bridges, the bridge downstream of the private dam near Red Hill Road was modeled both with and without an obstruction. The representative blockage obstructed approximately 35% of the bridge opening. This blockage increases water surface elevations upstream of the bridge by 9 inches for the 2-year storm, and 6 inches for the 100-year storm. The impact carries up to 800 feet upstream of the bridge for the 100-year storm. The results will be similar at any bridge throughout the model. Implementing a program to remove debris at bridges after a storm event will increase capacity of the channel and reduce the risk for localized flooding.

#### IV.B.11 Aggradation/Degradation

The sediment transport analysis completed for the project area supported the local consensus that the river is aggrading. During the field reconnaissance, data was collected at 21 sites throughout the East Branch and Main Stem of the Neversink River. Of these 21 sections, 14 (or two thirds) of the sections were aggrading or experiencing deposition. Aggradation is typically the result of over-widened channel conditions or excess sediment supply coming from eroding streambanks upstream. The key to minimizing the deposition is to restore a stable river section to a state that is capable of conveying the appropriate amount of material downstream. In order to accomplish this throughout the corridor, efforts will be made to minimize erosion at streambanks, hillslopes and other sediment sources as well as reshaping the channel form utilizing natural channel design to establish stable sections. The concept of aggradation/degradation was not looked at as a particular alternative to pursue, but rather to better understand factors or aggrading and degrading conditions in the stream. This can aid when designing projects throughout the watershed intended to stabilize the streams and provide improved flood conveyance. The data collected as part of this study in combination with the hydraulic model are key tools to providing the foundation needed to support designs for these types of projects.



*Figure 17 – Example Aggrading Section at Station 20+00*



*Figure 18 – Example Aggrading Section at Station 127+00*

Independent of the LFA, the NYCDEP and Rondout Neversink Stream Management Program have performed a streambank inventory through the project reaches as well as upstream. This inventory will be used to develop a list of priority bank stabilization projects for the Stream Management Program to address this issue.



## V. Benefit-Cost Analysis

A benefit-cost analysis was completed on six of the eleven areas of interest mentioned above. For each of the areas, a project cost was developed and compared to the benefits of the project. The benefits include maintenance of emergency facilities, reduction in flooding at residences, property damage, and loss of life. Each of the Alternatives is summarized below.

### V.B.1 Denning Road Dam near Red Hill Road

The removal of the Denning Road Dam near Red Hill Road did not provide wide spread benefits throughout the project area, but it does provide flood reduction benefits to three residences at a relatively low cost. The BCR for this project is 1.55.

#### Summary

Total Project Cost	\$97,000
Service Life	50 years
Total Benefits	\$150,249
BCR	1.55

**V.B.2 “Double Bridge” at Town Hall**

The project proposed at the bridge near the Denning Town Hall is a large multifaceted project that includes a new bridge crossing, the creating of flood plain, stabilization of a failed slope, and the relocation of Denning Town Hall. The large capital cost of the project is difficult to overcome within the BCA evaluation. The BCR for this project is 0.19.

Summary

Total Project Cost	\$1,750,000
Bridge Crossing	\$1,000,000
Floodplain	\$300,000
Slope Stabilization	\$200,000
Town Hall Relocation	\$250,000
Service Life	50 years
Total Benefits	\$339,277
BCR	0.19

**V.B.3 DOT Stacked Stone Wall DS of County Line/”Wellington Site”**

The restoration of the stream channel utilizing natural stream channel design will provide a balanced and stable stream at this location protecting the stacked stone wall and the County Road it supports. The number of residences directly affected is small and the large capital cost of the project is difficult to overcome within the BCA evaluation. The BCR for this project is 0.09.

Summary

Total Project Cost	\$1,500,000
Service Life	50 years
Total Benefits	\$133,314
BCR	0.09

#### **V.B.4 Church Hall/Downstream of Frost Valley Bridge**

The construction of a structure to separate the West Branch from the East Branch at this location would cost in excess of \$500,000. Since this is more than the value of the Church Hall, by inspection the BCA cannot be above 1 and the BCA analysis was not run. The more realistic approach at this site would be to raise the first floor of the Church above the base flood elevation. The BCR for raising the Church Hall above the Base Flood Elevation is 0.38.

##### Summary

Total Project Cost	\$150,000
Service Life	50 years
Total Benefits	\$57,285
BCR	0.38

#### **V.B.5 Tannery Flats**

The Tannery Flats area requires that structures in the 100-year floodplain be raised so that the first floor elevation is above the base flood elevation. The structures can be raised individually or part of a unified project. The BCA analysis is approximately the same for one house as it is for all of the houses. This is The BCR for this project is 1.44.

##### Summary (per house average)

Total Project Cost	\$50,000
Service Life	50 years
Total Benefits	\$72,078
BCR	1.44

### V.B.6 Hunter Road and Hunter Road Bridge

The Hunter Road site consists of two potential projects. The first is a large capital investment to raise Hunter Road above the flood elevation and replace both culverts as part of the reconstruction. The capital investment is substantial, but the documented loss of life at this location is evaluated as a large benefit. The BCR for the large project is 0.70.

#### Summary

Total Project Cost	\$1,600,000
Service Life	50 years
Total Benefits	\$1,121,044
BCR	0.70

A second smaller project consists of installing a warning system to alert drivers when the road is inundated. The cost of this project is relatively low compare due to the benefit. The BCR is 12.85.

#### Summary

Total Project Cost	\$10,000
Service Life	25 years
Total Benefits	\$156,501
BCR	12.85

**V.B.7 Claryville Road near Hunter Road Bridge**

This project consists of raising Claryville Road north of the Hunter Road intersection to prevent overtopping during a storm event. The alternative does not provide a direct benefit to any residence, and there is no documented loss of life. The roadway begin overtopped would restrict emergency vehicle access through this portion of Claryville Road. According to the model, Claryville Road is flooded at the location during a 25 year events. Similarly Denning Road to the north of Claryville is inundated between the 10 and 25 year events. While these routes are restricted, emergency egress is maintained to Claryville via Frost Valley Road. Frost Valley Road within the limits of the model is not overtopped during a 100-year event. With the high capital cost associated with this project, by inspection the BCA cannot be above 1 and the BCA analysis was not run.

**V.B.8 Fire Hall Culvert/Hillside Runoff**

The culvert was replaced at this site following Irene and no further work is necessary at this site.

### **V.B.9 Bungalow Brook at Claryville Road**

The Bungalow Brook culvert at Claryville Road has filled in with sediment, restricting the capacity. It is recommended that the County DPW clean the culvert to reestablish the original capacity, but this is likely a short term condition. The proposed long term measure includes a complete stream assessment and potential design to prevent significant deposition at the culvert. Proposed measures to reduce deposition at this location could include culvert replacement, stabilization of upstream sediment sources (primarily eroding stream banks) and restoration / modification of approximately 400 linear feet of Bungalow Brook to accommodate adequate sediment transport and reduce the risk of culvert obstruction during flood conditions. The benefits include reducing the potential for damage to the two local residents downstream and preventing Claryville Road from being overtopped.

The BCR for the long term project is 0.53.

#### Summary

Total Project Cost	\$274,000
Service Life	50 years
Total Benefits	\$146,206
BCR	0.53

### **V.B.10 Debris Blockage at Bridges**

Debris blockage at bridges in general was proven to have a negative impact on flooding, especially immediately upstream of the bridges themselves. The concept of removing the debris at bridges should be pursued as a standing post-flood response protocol. The development of specific guidelines outlining when and how the debris should be removed would provide a program that the local highway departments could follow in the wake of a storm.

**V.B.11      Aggradation/Degradation**

The sediment transport evaluation completed as part of this study provides valuable proof to the perception that the stream is aggrading in a number of locations. No particular project is proposed that explicitly addresses this concern that can be evaluated in the BCA tool. More importantly, all project progress in the drainage basin should be considered with regard to sediment transport concepts and the long term benefits this will have on the basin. Aggradation is typically the result of both post-flood channel widening without regard to naturally stable channel dimensions, and of excess sediment supply from the watershed, which is itself often the result of poor channel and floodplain management practices. The more projects that progress with these concepts in mind, the more stable the stream will become and consequently the more sustainable all of the projects, past or future, will be.

## VI. Additional Recommendations

These recommendations are provided to the Denning Neversink Flood Advisory Committee for further consideration.

- Developing an early warning system through a reverse 911 system or similar could be investigated to provide more advanced notice to residents in the event of a flood.
- Fuel tanks throughout the Towns can be elevated above flood stage and anchored to prevent movement or spilling during a flood.
- The advanced warning system suggested for Hunter Road could be pursued for other areas to warn motorists of locally flooded road conditions.
- Investigate the development a Town-wide database of storm damage that could be updated after every storm. This would provide useful data when determining which future projects to pursue; and help in gathering data for grant applications that require Benefit Cost Ratios. The database should include Base Flood elevations at each residence to accompany damage values.
- Implement a program to fund stabilization materials (rock of various sizes, sections of corrugated culvert) to be used for roadway protection during emergency response immediately following a flood.



## VII. Summary of Findings

The LFA process provides Claryville and the residents throughout the project area with a valuable tool to make informed decisions within the watershed moving forward. This document is a useful tool that will continue to evolve as projects are completed or as future projects arise. The HEC-RAS model developed for this study is available for future use to evaluate any potential project. Several of the projects proposed in this study are large capital projects that don't produce enough benefit to offset their large capital investment, while others are smaller, localized projects where the benefit better suits the expenditure. Only inundation hazards were evaluated as part of this study; where additional flood hazards due to bank erosion have created costs to infrastructure and/or have produced significant negative water quality impacts, these more expensive projects may rise to a priority level that warrants their progression in the future. Three projects were identified as having BCR ratios above 1.0. The potential projects are listed below beginning with the highest BCA.

<b>Project Description</b>	<b>Capital Cost</b>	<b>BCR</b>
Flood Warning System on Hunter Road	\$10,000	12.85
Remove Dam near Denning Road	\$97,000	1.55
Raise Tannery Flats Houses	\$50,000 (per house)	1.44
Hunter Road and Hunter Road Bridge	\$1,600,000	0.70
Bungalow Brook at Claryville Road	\$274,000	0.53
Church Hall/Downstream of Frost Valley Bridge	\$150,000	0.38
"Double Bridge" at Town Hall	\$1,750,000	0.19
DOT Stacked Stone Wall/Wellington Site	\$1,500,000	0.09

BCAs for the individual mitigation projects evaluated in this study could change as a result of accumulating damages from future floods, as additional knowledge of historical damages comes to light, or as the result of adjustments in the estimated cost of projects. Furthermore, where additional benefits of potential mitigation projects are identified, funding sources other than

those dedicated solely to mitigation of inundation risks to public and private property may be identified that make some of these projects feasible.

In addition to the three projects highlighted above, the Denning Neversink Flood Advisory Committee can pursue other forms of advance warning systems to alert residents and motorists during a flood. Fuel tanks can be secured and other sources of water pollution relocated or reinforced to prevent spills during a flood event.

***Action Items:***

- ***Implement flooded road warning sign at Hunter Road***
- ***Review Town Building Codes/Floodplain Management***
- ***Investigate further the project at Wellington/DOT Wall***
- ***Identify/Prioritize sediment sources upstream***
- ***Investigate further the project at Bungalow Brook***
- ***Increase documentation of damage and flood elevations during flood events***
- ***Increase size of Hunter Road culverts as they are replaced***

**APPENDIX A**

**Property Impact Summary Table**

Property Impact Table

	Existing					Proposed					
	10-Year	50-Year	100-Year	500-Year	500-Year	10-Year	50-Year	100-Year	500-Year	500-Year	
Alternative B.1 - Dam near Denning Road											
Discharge rates (cfs)	4350	7020	8420	11900	11900	4350	7020	8420	11900	11900	
1987 Denning Road WSEL	1743.9	1746.1	1746.8	1748.1	1748.1	1743.9	1746.1	1746.8	1748.1	1748.1	
2004 Denning Road WSEL	1744.8	1747.1	1748.0	1749.6	1749.6	1744.3	1746.6	1747.6	1749.3	1749.3	
2050 Denning Road WSEL	1746.1	1747.3	1748.8	1750.2	1750.2	1745.5	1747.1	1747.8	1749.7	1749.7	
Alternative B.2 - Double Bridge Near Town Hall 1											
Discharge rates (cfs)	4910	7900	9450	13400	13400	4910	7900	9450	13400	13400	
20 Sawmill Road WSEL	1699.5	1701.0	1701.4	1702.9	1702.9	1699.2	1700.9	1701.4	1702.9	1702.9	
10 Sawmill Road WSEL	1696.6	1698.4	1699.0	1700.2	1700.2	1696.3	1697.6	1698.1	1699.0	1699.0	
1549 Denning Road WSEL	1690.6	1692.5	1694.2	1694.5	1694.5	1690.3	1691.4	1692.1	1693.4	1693.4	
1546 Denning Road WSEL	1691.7	1693.3	1694.6	1695.3	1695.3	1691.6	1692.4	1692.7	1694.0	1694.0	
Denning Road - Raised road from 1694.6-1699.0	1696.6	1696.5	1697.4	1698.4	1698.4	1696.0	1696.5	1697.4	1698.3	1698.3	
Alternative B.3 - Wellington Site											
Discharge rates (cfs)	5120	8240	9830	13900	13900	5120	8240	9830	13900	13900	
981 Claryville Road WSEL	1646.1	1647.2	1647.8	1649.4	1649.4	1644.9	1646.5	1647.1	1648.5	1648.5	
1050 Claryville Road WSEL	1644.0	1645.0	1645.7	1647.0	1647.0	1642.7	1644.0	1644.5	1645.7	1645.7	
Stone Wall and CR 19 Protection WSEL	1645.3	1646.7	1647.3	1648.8	1648.8	1644.3	1645.6	1646.3	1647.6	1647.6	
Alternative B.4 - Church Hall											
Discharge rates (cfs)	5200	8370	10000	14100	14100	5200	8370	10000	14100	14100	
Elevation Church Hall above Base Flood EI	1619.1	1620.3	1620.7	1621.8	1621.8	1619.1	1620.3	1620.7	1621.8	1621.8	
Alternative B.6 - Hunter Road											
Discharge rates (cfs)	12800	19700	23100	31700	31700	12800	19700	23100	31700	31700	
Hunter Road - raised road from 1536.0-1540.0	1535.0	1537.4	1538.0	1540.6	1540.6	1534.9	1536.7	1538.0	1540.6	1540.6	

**APPENDIX B**

**HEC-RAS Results**

## ALTERNATIVE 1

Denning Road Dam near Red Hill Road







HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	41920.29	100 Yr	Existing Conditions	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41920.29	100 Yr	Dam Removal	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41697.86	100 Yr	Existing Conditions	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41697.86	100 Yr	Dam Removal	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41507.15	100 Yr	Existing Conditions	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41507.15	100 Yr	Dam Removal	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41302.8	100 Yr	Existing Conditions	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41302.8	100 Yr	Dam Removal	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41073.56	100 Yr	Existing Conditions	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	41073.56	100 Yr	Dam Removal	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	40734.5	100 Yr	Existing Conditions	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40734.5	100 Yr	Dam Removal	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40361.58	100 Yr	Existing Conditions	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	40361.58	100 Yr	Dam Removal	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	39944.83	100 Yr	Existing Conditions	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39944.83	100 Yr	Dam Removal	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39337.64	100 Yr	Existing Conditions	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	39337.64	100 Yr	Dam Removal	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	38819.33	100 Yr	Existing Conditions	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38819.33	100 Yr	Dam Removal	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38353.44	100 Yr	Existing Conditions	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38353.44	100 Yr	Dam Removal	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38013.46	100 Yr	Existing Conditions	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	38013.46	100 Yr	Dam Removal	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	37612.11	100 Yr	Existing Conditions	9830.00	1646.32	1655.34	1654.51	1657.14	0.010077	11.74	1152.92	272.38	0.80
1	37612.11	100 Yr	Dam Removal	9830.00	1646.32	1655.34	1654.51	1657.14	0.010077	11.74	1152.92	272.38	0.80
1	37267.72	100 Yr	Existing Conditions	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.15	400.78	0.66
1	37267.72	100 Yr	Dam Removal	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.15	400.78	0.66
1	37021.31	100 Yr	Existing Conditions	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80
1	37021.31	100 Yr	Dam Removal	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80
1	36892.31	100 Yr	Existing Conditions	9830.00	1640.58	1649.18	1648.46	1650.65	0.007702	10.28	1152.47	544.85	0.70

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	36892.31	100 Yr	Dam Removal	9830.00	1640.58	1649.18	1648.46	1650.65	0.007702	10.28	1152.47	544.85	0.70
1	36644.6	100 Yr	Existing Conditions	9830.00	1638.53	1647.39	1646.07	1648.80	0.007411	10.21	1336.78	652.49	0.69
1	36644.6	100 Yr	Dam Removal	9830.00	1638.53	1647.39	1646.07	1648.80	0.007411	10.21	1336.78	652.49	0.69
1	36282.06	100 Yr	Existing Conditions	9830.00	1635.58	1644.41	1643.17	1645.86	0.009331	10.44	1307.35	550.21	0.75
1	36282.06	100 Yr	Dam Removal	9830.00	1635.58	1644.41	1643.17	1645.86	0.009331	10.44	1307.35	550.21	0.75
1	35674.92	100 Yr	Existing Conditions	9830.00	1630.58	1638.26	1636.92	1639.58	0.011567	9.95	1435.05	509.85	0.81
1	35674.92	100 Yr	Dam Removal	9830.00	1630.58	1638.26	1636.92	1639.58	0.011567	9.95	1435.05	509.85	0.81
1	35184.46	100 Yr	Existing Conditions	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	35184.46	100 Yr	Dam Removal	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	34724.63	100 Yr	Existing Conditions	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34724.63	100 Yr	Dam Removal	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34430.11	100 Yr	Existing Conditions	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34430.11	100 Yr	Dam Removal	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34247.12	100 Yr	Existing Conditions	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34247.12	100 Yr	Dam Removal	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34207.13			Bridge									
1	34168.57	100 Yr	Existing Conditions	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	34168.57	100 Yr	Dam Removal	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	33927.21	100 Yr	Existing Conditions	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33927.21	100 Yr	Dam Removal	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33802.04	100 Yr	Existing Conditions	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33802.04	100 Yr	Dam Removal	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33694.16	100 Yr	Existing Conditions	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33694.16	100 Yr	Dam Removal	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33610.52	100 Yr	Existing Conditions	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33610.52	100 Yr	Dam Removal	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33447.2	100 Yr	Existing Conditions	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33447.2	100 Yr	Dam Removal	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33327.3	100 Yr	Existing Conditions	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68
1	33327.3	100 Yr	Dam Removal	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68
1	33137.67	100 Yr	Existing Conditions	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	33137.67	100 Yr	Dam Removal	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	32868.24	100 Yr	Existing Conditions	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32868.24	100 Yr	Dam Removal	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32552.6	100 Yr	Existing Conditions	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32552.6	100 Yr	Dam Removal	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32322.9 2975	100 Yr	Existing Conditions	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	32322.9 2975	100 Yr	Dam Removal	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	31921.77	100 Yr	Existing Conditions	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5684.92	1042.14	0.50
1	31921.77	100 Yr	Dam Removal	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5685.04	1042.14	0.50
1	31504.35	100 Yr	Existing Conditions	22100.00	1593.82	1605.80	1605.48	1607.49	0.004398	13.59	4817.28	1138.04	0.78
1	31504.35	100 Yr	Dam Removal	22100.00	1593.82	1605.80	1605.48	1607.49	0.004399	13.59	4816.88	1137.99	0.78
1	31174.35	100 Yr	Existing Conditions	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	31174.35	100 Yr	Dam Removal	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	30558.18	100 Yr	Existing Conditions	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30558.18	100 Yr	Dam Removal	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30109.75	100 Yr	Existing Conditions	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	30109.75	100 Yr	Dam Removal	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	29696.23	100 Yr	Existing Conditions	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	29696.23	100 Yr	Dam Removal	22100.00	1584.16	1594.34		1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	28118.61	100 Yr	Existing Conditions	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	28118.61	100 Yr	Dam Removal	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	27478.04	100 Yr	Existing Conditions	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	27478.04	100 Yr	Dam Removal	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	26847.86	100 Yr	Existing Conditions	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26847.86	100 Yr	Dam Removal	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26215.31 2986	100 Yr	Existing Conditions	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	26215.31 2986	100 Yr	Dam Removal	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	25352.85	100 Yr	Existing Conditions	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25352.85	100 Yr	Dam Removal	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25059.5	100 Yr	Existing Conditions	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79
1	25059.5	100 Yr	Dam Removal	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	24652.63	100 Yr	Existing Conditions	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24652.63	100 Yr	Dam Removal	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24196.99	100 Yr	Existing Conditions	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	24196.99	100 Yr	Dam Removal	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	23552.39	100 Yr	Existing Conditions	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	23552.39	100 Yr	Dam Removal	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	22926.81	100 Yr	Existing Conditions	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22926.81	100 Yr	Dam Removal	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22490.96	100 Yr	Existing Conditions	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	22490.96	100 Yr	Dam Removal	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	21814.55	100 Yr	Existing Conditions	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21814.55	100 Yr	Dam Removal	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21558.83	100 Yr	Existing Conditions	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21558.83	100 Yr	Dam Removal	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21512.55		Bridge										
1	21472.38	100 Yr	Existing Conditions	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21472.38	100 Yr	Dam Removal	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21272.9	100 Yr	Existing Conditions	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21272.9	100 Yr	Dam Removal	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21023.87	100 Yr	Existing Conditions	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	21023.87	100 Yr	Dam Removal	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	20756.42	100 Yr	Existing Conditions	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20756.42	100 Yr	Dam Removal	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20469.79	100 Yr	Existing Conditions	23100.00	1525.07	1538.70	1538.57	1541.52	0.003845	14.49	3546.73	922.37	0.75
1	20469.79	100 Yr	Dam Removal	23100.00	1525.07	1538.70	1538.57	1541.52	0.003845	14.49	3546.73	922.37	0.75
1	20244.22	100 Yr	Existing Conditions	23100.00	1525.47	1538.77	1537.38	1540.22	0.001949	11.05	4952.52	960.69	0.55
1	20244.22	100 Yr	Dam Removal	23100.00	1525.47	1538.77	1537.38	1540.22	0.001949	11.05	4952.52	960.69	0.55
1	20211.1		Bridge										
1	20178.31	100 Yr	Existing Conditions	23100.00	1524.32	1536.78	1536.78	1539.28	0.003567	13.98	3838.46	909.16	0.73
1	20178.31	100 Yr	Dam Removal	23100.00	1524.32	1536.78	1536.78	1539.28	0.003567	13.98	3838.46	909.16	0.73
1	19969.12	100 Yr	Existing Conditions	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	19969.12	100 Yr	Dam Removal	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19810.17	100 Yr	Existing Conditions	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19810.17	100 Yr	Dam Removal	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19169.45	100 Yr	Existing Conditions	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	19169.45	100 Yr	Dam Removal	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	18531.66	100 Yr	Existing Conditions	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	18531.66	100 Yr	Dam Removal	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	17960.92	100 Yr	Existing Conditions	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17960.92	100 Yr	Dam Removal	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17258.82	100 Yr	Existing Conditions	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	17258.82	100 Yr	Dam Removal	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	16682.16	100 Yr	Existing Conditions	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16682.16	100 Yr	Dam Removal	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16252.2	100 Yr	Existing Conditions	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	16252.2	100 Yr	Dam Removal	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	15837.86	100 Yr	Existing Conditions	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15837.86	100 Yr	Dam Removal	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15420.14	100 Yr	Existing Conditions	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	15420.14	100 Yr	Dam Removal	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	14922.03	100 Yr	Existing Conditions	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14922.03	100 Yr	Dam Removal	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14691.12	100 Yr	Existing Conditions	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14691.12	100 Yr	Dam Removal	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14318.94	100 Yr	Existing Conditions	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	14318.94	100 Yr	Dam Removal	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	13644.12	100 Yr	Existing Conditions	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	13644.12	100 Yr	Dam Removal	23700.00	1489.59	1502.39		1504.52	0.003214	11.80	2186.45	253.17	0.67
1	12869.51	100 Yr	Existing Conditions	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12869.51	100 Yr	Dam Removal	23700.00	1483.16	1500.78		1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12234	100 Yr	Existing Conditions	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53
1	12234	100 Yr	Dam Removal	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	11498.04	100 Yr	Existing Conditions	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11498.04	100 Yr	Dam Removal	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11273.88	100 Yr	Existing Conditions	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	11273.88	100 Yr	Dam Removal	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	10834.88	100 Yr	Existing Conditions	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10834.88	100 Yr	Dam Removal	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10323.01	100 Yr	Existing Conditions	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	10323.01	100 Yr	Dam Removal	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	9660.539	100 Yr	Existing Conditions	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	9660.539	100 Yr	Dam Removal	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	8871.451	100 Yr	Existing Conditions	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8871.451	100 Yr	Dam Removal	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8240.325	100 Yr	Existing Conditions	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	8240.325	100 Yr	Dam Removal	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	7746.589	100 Yr	Existing Conditions	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7746.589	100 Yr	Dam Removal	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7095.764	100 Yr	Existing Conditions	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	7095.764	100 Yr	Dam Removal	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	6615.735	100 Yr	Existing Conditions	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6615.735	100 Yr	Dam Removal	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6072.811	100 Yr	Existing Conditions	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	6072.811	100 Yr	Dam Removal	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	5545.166	100 Yr	Existing Conditions	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5545.166	100 Yr	Dam Removal	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5139.7	100 Yr	Existing Conditions	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	5139.7	100 Yr	Dam Removal	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	4667.436	100 Yr	Existing Conditions	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4667.436	100 Yr	Dam Removal	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4475.51	100 Yr	Existing Conditions	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4475.51	100 Yr	Dam Removal	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4282.712	100 Yr	Existing Conditions	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46
1	4282.712	100 Yr	Dam Removal	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	4102.991	100 Yr	Existing Conditions	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	4102.991	100 Yr	Dam Removal	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	3949.696	100 Yr	Existing Conditions	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3949.696	100 Yr	Dam Removal	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3749.133	100 Yr	Existing Conditions	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3749.133	100 Yr	Dam Removal	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3601.239	100 Yr	Existing Conditions	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3601.239	100 Yr	Dam Removal	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3340.424	100 Yr	Existing Conditions	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	3340.424	100 Yr	Dam Removal	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	2882.748 3039	100 Yr	Existing Conditions	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2882.748 3039	100 Yr	Dam Removal	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2502.781	100 Yr	Existing Conditions	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66
1	2502.781	100 Yr	Dam Removal	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66

## ALTERNATIVE 2

“Double Bridge” at Town Hall



HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch EI (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
1	51162.24 206	100 Yr	Existing Conditions	8070.00	1777.98	1787.30	1787.04	1789.39	0.011975	12.79	911.98	195.44	0.75
1	51162.24 206	100 Yr	NewBridge Raised Rd	8070.00	1777.98	1787.30	1787.04	1789.39	0.011975	12.79	911.98	195.44	0.75
1	50527.69 207	100 Yr	Existing Conditions	8070.00	1772.13	1780.66	1780.66	1782.07	0.010477	11.01	1606.33	602.66	0.68
1	50527.69 207	100 Yr	NewBridge Raised Rd	8070.00	1772.13	1780.66	1780.66	1782.07	0.010477	11.01	1606.33	602.66	0.68
1	50027.69 208	100 Yr	Existing Conditions	8070.00	1768.90	1775.97	1774.63	1776.70	0.006662	8.87	2179.82	722.88	0.64
1	50027.69 208	100 Yr	NewBridge Raised Rd	8070.00	1768.90	1775.75	1774.63	1776.57	0.007833	9.38	2020.78	705.76	0.69
1	49527.69 209	100 Yr	Existing Conditions	8070.00	1761.98	1770.44	1770.44	1772.56	0.010076	12.87	1189.23	398.17	0.81
1	49527.69 209	100 Yr	NewBridge Raised Rd	8070.00	1761.98	1770.91	1770.44	1772.63	0.007809	11.78	1387.20	454.60	0.72
1	49027.68 210	100 Yr	Existing Conditions	8070.00	1758.28	1767.25	1767.25	1768.67	0.007740	12.02	1294.00	461.17	0.73
1	49027.68 210	100 Yr	NewBridge Raised Rd	8070.00	1758.28	1767.25	1767.25	1768.67	0.007740	12.02	1294.00	461.17	0.73
1	48527.67 211	100 Yr	Existing Conditions	8070.00	1754.37	1762.25	1762.21	1763.48	0.009671	12.07	1122.44	346.38	0.79
1	48527.67 211	100 Yr	NewBridge Raised Rd	8070.00	1754.37	1762.21	1762.21	1763.48	0.010010	12.24	1109.21	345.78	0.80
1	48027.67 212	100 Yr	Existing Conditions	8070.00	1751.01	1756.96	1756.44	1757.54	0.008727	8.06	1435.29	607.88	0.69
1	48027.67 212	100 Yr	NewBridge Raised Rd	8070.00	1750.84	1756.93	1756.63	1757.62	0.009186	9.81	1460.65	589.69	0.74
1	47527.67 213	100 Yr	Existing Conditions	8070.00	1743.11	1752.90	1752.90	1754.12	0.006016	11.42	1812.50	594.98	0.65
1	47527.67 213	100 Yr	NewBridge Raised Rd	8070.00	1743.11	1752.90	1752.90	1754.12	0.006016	11.42	1812.50	594.98	0.65
1	47197.53	100 Yr	Existing Conditions	8420.00	1739.26	1750.36	1748.71	1751.26	0.005375	8.97	2072.22	532.18	0.52
1	47197.53	100 Yr	NewBridge Raised Rd	8420.00	1739.26	1750.36	1748.71	1751.26	0.005375	8.97	2072.22	532.18	0.52
1	47118.37	100 Yr	Existing Conditions	8420.00	1738.76	1749.02	1749.02	1750.66	0.008672	11.89	1599.52	515.10	0.68
1	47118.37	100 Yr	NewBridge Raised Rd	8420.00	1738.76	1749.02	1749.02	1750.66	0.008672	11.89	1599.52	515.10	0.68
1	46733.22	100 Yr	Existing Conditions	8420.00	1736.33	1747.82	1745.13	1748.34	0.002861	7.02	2058.72	356.10	0.38
1	46733.22	100 Yr	NewBridge Raised Rd	8420.00	1736.33	1747.82	1745.13	1748.34	0.002862	7.02	2058.24	356.10	0.38
1	46581.2	100 Yr	Existing Conditions	8420.00	1736.33	1746.47	1744.58	1747.57	0.006147	9.47	1594.20	278.73	0.56
1	46581.2	100 Yr	NewBridge Raised Rd	8420.00	1736.33	1746.47	1744.58	1747.56	0.006155	9.48	1593.41	278.72	0.56
1	46555.71			Inl Struct									
1	46529.91	100 Yr	Existing Conditions	8420.00	1732.25	1746.78	1740.67	1747.45	0.002286	7.19	1943.68	244.69	0.34
1	46529.91	100 Yr	NewBridge Raised Rd	8420.00	1732.25	1746.78	1740.67	1747.45	0.002286	7.19	1943.68	244.69	0.34
1	46460	100 Yr	Existing Conditions	8420.00	1732.16	1746.53	1741.60	1747.27	0.002375	7.69	1980.35	268.00	0.37
1	46460	100 Yr	NewBridge Raised Rd	8420.00	1732.16	1746.53	1741.60	1747.27	0.002375	7.69	1980.35	268.00	0.37
1	46348.8	100 Yr	Existing Conditions	8420.00	1731.98	1746.02	1743.47	1746.82	0.004695	9.22	1949.19	305.80	0.49
1	46348.8	100 Yr	NewBridge Raised Rd	8420.00	1731.98	1746.02	1743.47	1746.82	0.004695	9.22	1949.19	305.80	0.49

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	46286.65			Mult Open									
1	46227.84	100 Yr	Existing Conditions	8420.00	1730.58	1743.86	1741.59	1744.82	0.005222	9.43	1892.22	345.20	0.52
1	46227.84	100 Yr	NewBridge Raised Rd	8420.00	1730.58	1743.86	1741.59	1744.82	0.005222	9.43	1892.17	345.20	0.52
1	46051.98	100 Yr	Existing Conditions	8420.00	1730.73	1739.15	1739.15	1742.47	0.019581	15.38	727.12	301.86	0.97
1	46051.98	100 Yr	NewBridge Raised Rd	8420.00	1730.73	1739.15	1739.15	1742.47	0.019581	15.38	727.12	301.86	0.97
1	45886.62	100 Yr	Existing Conditions	8530.00	1730.10	1737.96	1737.48	1739.01	0.010015	10.37	1378.15	364.32	0.68
1	45886.62	100 Yr	NewBridge Raised Rd	8530.00	1730.10	1737.72	1737.48	1738.94	0.012047	11.11	1288.82	363.53	0.74
1	45738.55	100 Yr	Existing Conditions	8530.00	1729.15	1737.46	1736.21	1737.90	0.003932	6.82	1850.78	394.89	0.44
1	45738.55	100 Yr	NewBridge Raised Rd	8530.00	1729.15	1737.14	1736.21	1737.66	0.004842	7.34	1723.53	393.93	0.49
1	45444.25 2931	100 Yr	Existing Conditions	8530.00	1724.84	1734.21	1734.21	1735.96	0.013114	12.16	1111.99	409.37	0.80
1	45444.25 2931	100 Yr	NewBridge Raised Rd	8530.00	1724.84	1735.06	1734.21	1736.03	0.006933	9.52	1459.30	411.62	0.59
1	45091.89	100 Yr	Existing Conditions	9050.00	1722.40	1730.89	1730.76	1732.45	0.013738	13.12	1561.13	395.93	0.83
1	45091.89	100 Yr	NewBridge Raised Rd	9050.00	1722.40	1730.76	1730.76	1732.45	0.014929	13.53	1511.66	395.48	0.86
1	44954.64	100 Yr	Existing Conditions	9050.00	1721.96	1729.20	1728.72	1730.55	0.012970	11.25	1356.94	474.68	0.77
1	44954.64	100 Yr	NewBridge Raised Rd	9050.00	1721.96	1729.44	1728.72	1730.56	0.010491	10.36	1472.16	475.37	0.70
1	44674.6	100 Yr	Existing Conditions	9050.00	1719.56	1727.27	1724.63	1727.90	0.006681	8.53	2128.23	593.47	0.57
1	44674.6	100 Yr	NewBridge Raised Rd	9050.00	1719.56	1726.63	1724.63	1727.62	0.011112	10.33	1760.83	549.55	0.72
1	44260.92	100 Yr	Existing Conditions	9450.00	1714.80	1721.33	1721.33	1722.95	0.026062	13.38	1389.81	441.40	1.06
1	44260.92	100 Yr	NewBridge Raised Rd	9450.00	1714.80	1722.50	1721.33	1723.25	0.010129	9.60	2057.80	608.29	0.68
1	43730.37	100 Yr	Existing Conditions	9450.00	1709.31	1717.30	1716.00	1718.09	0.008780	9.43	1980.03	469.50	0.64
1	43730.37	100 Yr	NewBridge Raised Rd	9450.00	1709.31	1717.13	1716.00	1718.00	0.009835	9.82	1900.43	464.65	0.67
1	43286.55	100 Yr	Existing Conditions	9450.00	1700.81	1711.78	1710.77	1713.84	0.010017	12.54	1201.61	255.99	0.72
1	43286.55	100 Yr	NewBridge Raised Rd	9450.00	1700.81	1712.57	1710.77	1714.20	0.007304	11.30	1452.50	385.57	0.63
1	42794.94	100 Yr	Existing Conditions	9450.00	1696.65	1706.97	1706.97	1709.47	0.012731	13.84	1154.56	483.81	0.81
1	42794.94	100 Yr	NewBridge Raised Rd	9450.00	1696.65	1706.97	1706.97	1709.47	0.012731	13.84	1154.56	483.81	0.81
1	42389.03	100 Yr	Existing Conditions	9450.00	1694.63	1703.76	1701.07	1704.58	0.005747	8.44	2294.41	554.56	0.54
1	42389.03	100 Yr	NewBridge Raised Rd	9450.00	1694.63	1703.76	1701.07	1704.58	0.005747	8.44	2294.41	554.56	0.54
1	42201.59	100 Yr	Existing Conditions	9450.00	1691.57	1701.43	1701.43	1703.11	0.009732	12.61	1935.94	562.32	0.72
1	42201.59	100 Yr	NewBridge Raised Rd	9450.00	1691.57	1701.43	1701.43	1703.11	0.009732	12.61	1935.94	562.32	0.72
1	41976.57	100 Yr	Existing Conditions	9450.00	1685.63	1701.31	1696.86	1701.54	0.001303	5.07	2794.47	551.80	0.26
1	41976.57	100 Yr	NewBridge Raised Rd	9450.00	1685.63	1699.95	1695.36	1700.68	0.003025	7.07	1403.20	479.88	0.39

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	41942.61			Bridge									
1	41920.29	100 Yr	Existing Conditions	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41920.29	100 Yr	NewBridge Raised Rd	9450.00	1685.56	1697.36	1695.47	1698.75	0.008687	9.86	1006.56	520.99	0.64
1	41697.86	100 Yr	Existing Conditions	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41697.86	100 Yr	NewBridge Raised Rd	9450.00	1687.43	1696.55	1695.69	1697.37	0.007195	9.83	1894.14	654.38	0.60
1	41507.15	100 Yr	Existing Conditions	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41507.15	100 Yr	NewBridge Raised Rd	9510.00	1686.10	1694.81	1694.17	1695.96	0.007777	10.54	1388.25	691.33	0.70
1	41302.8	100 Yr	Existing Conditions	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41302.8	100 Yr	NewBridge Raised Rd	9510.00	1683.03	1691.72	1691.72	1693.85	0.013282	13.04	914.16	479.88	0.90
1	41073.56	100 Yr	Existing Conditions	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	41073.56	100 Yr	NewBridge Raised Rd	9510.00	1679.64	1689.83	1688.66	1691.37	0.006695	11.50	1088.85	416.64	0.68
1	40734.5	100 Yr	Existing Conditions	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40734.5	100 Yr	NewBridge Raised Rd	9510.00	1676.38	1685.97	1685.45	1688.57	0.009694	13.57	972.50	245.37	0.80
1	40361.58	100 Yr	Existing Conditions	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	40361.58	100 Yr	NewBridge Raised Rd	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	39944.83	100 Yr	Existing Conditions	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39944.83	100 Yr	NewBridge Raised Rd	9510.00	1667.53	1677.51	1677.30	1678.89	0.008317	11.28	1442.38	713.31	0.73
1	39337.64	100 Yr	Existing Conditions	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	39337.64	100 Yr	NewBridge Raised Rd	9510.00	1660.72	1671.97	1671.57	1673.66	0.009211	10.95	1272.45	568.87	0.75
1	38819.33	100 Yr	Existing Conditions	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38819.33	100 Yr	NewBridge Raised Rd	9830.00	1657.15	1667.17	1666.93	1669.07	0.008487	12.28	1483.04	372.88	0.76
1	38353.44	100 Yr	Existing Conditions	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38353.44	100 Yr	NewBridge Raised Rd	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38013.46	100 Yr	Existing Conditions	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	38013.46	100 Yr	NewBridge Raised Rd	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	37612.11	100 Yr	Existing Conditions	9830.00	1646.32	1655.34	1654.51	1657.14	0.010077	11.74	1152.92	272.38	0.80
1	37612.11	100 Yr	NewBridge Raised Rd	9830.00	1646.32	1655.34	1654.51	1657.14	0.010078	11.74	1152.89	272.38	0.80
1	37267.72	100 Yr	Existing Conditions	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.15	400.78	0.66
1	37267.72	100 Yr	NewBridge Raised Rd	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.17	400.78	0.66
1	37021.31	100 Yr	Existing Conditions	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80
1	37021.31	100 Yr	NewBridge Raised Rd	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch EI (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
1	36892.31	100 Yr	Existing Conditions	9830.00	1640.58	1649.18	1648.46	1650.65	0.007702	10.28	1152.47	544.85	0.70
1	36892.31	100 Yr	NewBridge Raised Rd	9830.00	1640.58	1649.19	1648.46	1650.66	0.007684	10.27	1153.47	544.91	0.70
1	36644.6	100 Yr	Existing Conditions	9830.00	1638.53	1647.39	1646.07	1648.80	0.007411	10.21	1336.78	652.49	0.69
1	36644.6	100 Yr	NewBridge Raised Rd	9830.00	1638.53	1647.41	1646.07	1648.82	0.007305	10.16	1344.23	653.85	0.68
1	36282.06	100 Yr	Existing Conditions	9830.00	1635.58	1644.41	1643.17	1645.86	0.009331	10.44	1307.35	550.21	0.75
1	36282.06	100 Yr	NewBridge Raised Rd	9830.00	1635.58	1644.33	1643.17	1645.83	0.009791	10.60	1285.92	549.17	0.76
1	35674.92	100 Yr	Existing Conditions	9830.00	1630.58	1638.26	1636.92	1639.58	0.011567	9.95	1435.05	509.85	0.81
1	35674.92	100 Yr	NewBridge Raised Rd	9830.00	1630.58	1638.37	1636.92	1639.62	0.010610	9.68	1480.62	510.77	0.78
1	35184.46	100 Yr	Existing Conditions	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	35184.46	100 Yr	NewBridge Raised Rd	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	34724.63	100 Yr	Existing Conditions	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34724.63	100 Yr	NewBridge Raised Rd	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34430.11	100 Yr	Existing Conditions	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34430.11	100 Yr	NewBridge Raised Rd	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34247.12	100 Yr	Existing Conditions	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34247.12	100 Yr	NewBridge Raised Rd	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34207.13		Bridge										
1	34168.57	100 Yr	Existing Conditions	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	34168.57	100 Yr	NewBridge Raised Rd	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	33927.21	100 Yr	Existing Conditions	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33927.21	100 Yr	NewBridge Raised Rd	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33802.04	100 Yr	Existing Conditions	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33802.04	100 Yr	NewBridge Raised Rd	10000.00	1612.01	1621.58	1621.14	1622.94	0.006280	10.46	1414.90	959.43	0.65
1	33694.16	100 Yr	Existing Conditions	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33694.16	100 Yr	NewBridge Raised Rd	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33610.52	100 Yr	Existing Conditions	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33610.52	100 Yr	NewBridge Raised Rd	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33447.2	100 Yr	Existing Conditions	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33447.2	100 Yr	NewBridge Raised Rd	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33327.3	100 Yr	Existing Conditions	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68
1	33327.3	100 Yr	NewBridge Raised Rd	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch EI (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
1	33137.67	100 Yr	Existing Conditions	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	33137.67	100 Yr	NewBridge Raised Rd	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	32868.24	100 Yr	Existing Conditions	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32868.24	100 Yr	NewBridge Raised Rd	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32552.6	100 Yr	Existing Conditions	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32552.6	100 Yr	NewBridge Raised Rd	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32322.9 2975	100 Yr	Existing Conditions	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	32322.9 2975	100 Yr	NewBridge Raised Rd	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	31921.77	100 Yr	Existing Conditions	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5684.92	1042.14	0.50
1	31921.77	100 Yr	NewBridge Raised Rd	22100.00	1595.30	1608.68	1605.57	1609.28	0.003737	8.39	5681.23	1042.11	0.50
1	31504.35	100 Yr	Existing Conditions	22100.00	1593.82	1605.80	1605.48	1607.49	0.004398	13.59	4817.28	1138.04	0.78
1	31504.35	100 Yr	NewBridge Raised Rd	22100.00	1593.82	1605.81	1605.48	1607.50	0.004369	13.56	4830.76	1139.49	0.78
1	31174.35	100 Yr	Existing Conditions	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	31174.35	100 Yr	NewBridge Raised Rd	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	30558.18	100 Yr	Existing Conditions	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30558.18	100 Yr	NewBridge Raised Rd	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30109.75	100 Yr	Existing Conditions	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	30109.75	100 Yr	NewBridge Raised Rd	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	29696.23	100 Yr	Existing Conditions	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	29696.23	100 Yr	NewBridge Raised Rd	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	28118.61	100 Yr	Existing Conditions	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	28118.61	100 Yr	NewBridge Raised Rd	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	27478.04	100 Yr	Existing Conditions	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	27478.04	100 Yr	NewBridge Raised Rd	22200.00	1571.21	1582.76	1580.93	1584.05	0.003009	10.04	4473.44	925.42	0.63
1	26847.86	100 Yr	Existing Conditions	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26847.86	100 Yr	NewBridge Raised Rd	22500.00	1566.07	1579.28	1578.05	1581.36	0.006141	12.83	3633.74	1351.62	0.67
1	26215.31 2986	100 Yr	Existing Conditions	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	26215.31 2986	100 Yr	NewBridge Raised Rd	22500.00	1564.22	1575.97	1574.55	1577.01	0.006789	12.17	5906.46	1632.11	0.68
1	25352.85	100 Yr	Existing Conditions	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25352.85	100 Yr	NewBridge Raised Rd	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25059.5	100 Yr	Existing Conditions	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79
1	25059.5	100 Yr	NewBridge Raised Rd	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch EI (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
1	24652.63	100 Yr	Existing Conditions	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24652.63	100 Yr	NewBridge Raised Rd	22800.00	1552.48	1565.83	1565.23	1567.78	0.006069	13.65	4163.70	1185.15	0.68
1	24196.99	100 Yr	Existing Conditions	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	24196.99	100 Yr	NewBridge Raised Rd	23000.00	1551.94	1563.33	1560.55	1564.89	0.006054	11.44	3785.45	1182.23	0.65
1	23552.39	100 Yr	Existing Conditions	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	23552.39	100 Yr	NewBridge Raised Rd	23000.00	1546.82	1558.70	1557.50	1560.50	0.007710	13.06	3350.02	1147.46	0.74
1	22926.81	100 Yr	Existing Conditions	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22926.81	100 Yr	NewBridge Raised Rd	23000.00	1542.83	1555.46	1553.43	1556.61	0.004915	8.85	3159.03	1254.09	0.57
1	22490.96	100 Yr	Existing Conditions	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	22490.96	100 Yr	NewBridge Raised Rd	23000.00	1541.73	1551.08	1550.84	1553.26	0.012679	12.04	2310.98	1145.36	0.87
1	21814.55	100 Yr	Existing Conditions	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21814.55	100 Yr	NewBridge Raised Rd	23000.00	1536.76	1547.33	1545.44	1547.94	0.004564	7.47	5706.26	1703.84	0.53
1	21558.83	100 Yr	Existing Conditions	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21558.83	100 Yr	NewBridge Raised Rd	23000.00	1534.22	1546.50	1544.02	1546.93	0.002544	6.87	7546.33	1668.61	0.41
1	21512.55			Bridge									
1	21472.38	100 Yr	Existing Conditions	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21472.38	100 Yr	NewBridge Raised Rd	23000.00	1533.06	1545.54	1543.28	1546.14	0.003672	8.18	7137.77	1617.65	0.50
1	21272.9	100 Yr	Existing Conditions	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21272.9	100 Yr	NewBridge Raised Rd	23000.00	1532.08	1545.14	1542.05	1545.57	0.002070	6.91	8961.64	1454.48	0.39
1	21023.87	100 Yr	Existing Conditions	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	21023.87	100 Yr	NewBridge Raised Rd	23100.00	1529.50	1543.53	1542.64	1544.86	0.004601	11.39	6065.60	1279.68	0.58
1	20756.42	100 Yr	Existing Conditions	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20756.42	100 Yr	NewBridge Raised Rd	23100.00	1526.04	1540.42	1540.42	1543.13	0.007714	14.56	3728.72	1056.42	0.75
1	20469.79	100 Yr	Existing Conditions	23100.00	1525.07	1538.70	1538.57	1541.52	0.003845	14.49	3546.73	922.37	0.75
1	20469.79	100 Yr	NewBridge Raised Rd	23100.00	1525.07	1538.70	1538.57	1541.52	0.003845	14.49	3546.73	922.37	0.75
1	20244.22	100 Yr	Existing Conditions	23100.00	1525.47	1538.77	1537.38	1540.22	0.001949	11.05	4952.52	960.69	0.55
1	20244.22	100 Yr	NewBridge Raised Rd	23100.00	1525.47	1538.77	1537.38	1540.22	0.001949	11.05	4952.52	960.69	0.55
1	20211.1			Bridge									
1	20178.31	100 Yr	Existing Conditions	23100.00	1524.32	1536.78	1536.78	1539.28	0.003567	13.98	3838.46	909.16	0.73
1	20178.31	100 Yr	NewBridge Raised Rd	23100.00	1524.32	1536.78	1536.78	1539.28	0.003567	13.98	3838.46	909.16	0.73

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	19969.12	100 Yr	Existing Conditions	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19969.12	100 Yr	NewBridge Raised Rd	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19810.17	100 Yr	Existing Conditions	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19810.17	100 Yr	NewBridge Raised Rd	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19169.45	100 Yr	Existing Conditions	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	19169.45	100 Yr	NewBridge Raised Rd	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	18531.66	100 Yr	Existing Conditions	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	18531.66	100 Yr	NewBridge Raised Rd	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	17960.92	100 Yr	Existing Conditions	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17960.92	100 Yr	NewBridge Raised Rd	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17258.82	100 Yr	Existing Conditions	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	17258.82	100 Yr	NewBridge Raised Rd	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	16682.16	100 Yr	Existing Conditions	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16682.16	100 Yr	NewBridge Raised Rd	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16252.2	100 Yr	Existing Conditions	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	16252.2	100 Yr	NewBridge Raised Rd	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	15837.86	100 Yr	Existing Conditions	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15837.86	100 Yr	NewBridge Raised Rd	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15420.14	100 Yr	Existing Conditions	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	15420.14	100 Yr	NewBridge Raised Rd	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	14922.03	100 Yr	Existing Conditions	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14922.03	100 Yr	NewBridge Raised Rd	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14691.12	100 Yr	Existing Conditions	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14691.12	100 Yr	NewBridge Raised Rd	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14318.94	100 Yr	Existing Conditions	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	14318.94	100 Yr	NewBridge Raised Rd	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	13644.12	100 Yr	Existing Conditions	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	13644.12	100 Yr	NewBridge Raised Rd	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	12869.51	100 Yr	Existing Conditions	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12869.51	100 Yr	NewBridge Raised Rd	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12234	100 Yr	Existing Conditions	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53
1	12234	100 Yr	NewBridge Raised Rd	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch EI (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
1	11498.04	100 Yr	Existing Conditions	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11498.04	100 Yr	NewBridge Raised Rd	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11273.88	100 Yr	Existing Conditions	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	11273.88	100 Yr	NewBridge Raised Rd	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	10834.88	100 Yr	Existing Conditions	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10834.88	100 Yr	NewBridge Raised Rd	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10323.01	100 Yr	Existing Conditions	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	10323.01	100 Yr	NewBridge Raised Rd	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	9660.539	100 Yr	Existing Conditions	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	9660.539	100 Yr	NewBridge Raised Rd	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	8871.451	100 Yr	Existing Conditions	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8871.451	100 Yr	NewBridge Raised Rd	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8240.325	100 Yr	Existing Conditions	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	8240.325	100 Yr	NewBridge Raised Rd	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	7746.589	100 Yr	Existing Conditions	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7746.589	100 Yr	NewBridge Raised Rd	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7095.764	100 Yr	Existing Conditions	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	7095.764	100 Yr	NewBridge Raised Rd	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	6615.735	100 Yr	Existing Conditions	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6615.735	100 Yr	NewBridge Raised Rd	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6072.811	100 Yr	Existing Conditions	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	6072.811	100 Yr	NewBridge Raised Rd	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	5545.166	100 Yr	Existing Conditions	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5545.166	100 Yr	NewBridge Raised Rd	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5139.7	100 Yr	Existing Conditions	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	5139.7	100 Yr	NewBridge Raised Rd	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	4667.436	100 Yr	Existing Conditions	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4667.436	100 Yr	NewBridge Raised Rd	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4475.51	100 Yr	Existing Conditions	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4475.51	100 Yr	NewBridge Raised Rd	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4282.712	100 Yr	Existing Conditions	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46



HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	4282.712	100 Yr	NewBridge Raised Rd	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46
1	4102.991	100 Yr	Existing Conditions	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	4102.991	100 Yr	NewBridge Raised Rd	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	3949.696	100 Yr	Existing Conditions	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3949.696	100 Yr	NewBridge Raised Rd	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3749.133	100 Yr	Existing Conditions	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3749.133	100 Yr	NewBridge Raised Rd	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3601.239	100 Yr	Existing Conditions	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3601.239	100 Yr	NewBridge Raised Rd	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3340.424	100 Yr	Existing Conditions	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	3340.424	100 Yr	NewBridge Raised Rd	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2593.02	355.16	0.56
1	2882.748 3039	100 Yr	Existing Conditions	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2882.748 3039	100 Yr	NewBridge Raised Rd	24200.00	1433.99	1441.76	1441.57	1444.40	0.007161	13.09	1983.06	423.33	0.93
1	2502.781	100 Yr	Existing Conditions	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66
1	2502.781	100 Yr	NewBridge Raised Rd	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66

## ALTERNATIVE 3

DOT Stacked Stone Wall DS of County Line/"Wellington Site"

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr

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
1	51162.24 206	100 Yr	Existing Conditions	8070.00	1777.98	1787.30	1787.04	1789.39	0.011975	12.79	911.98	195.44	0.75
1	51162.24 206	100 Yr	Wellington Nat Res	8070.00	1777.98	1787.30	1787.04	1789.39	0.011975	12.79	911.98	195.44	0.75
1	50527.69 207	100 Yr	Existing Conditions	8070.00	1772.13	1780.66	1780.66	1782.07	0.010477	11.01	1606.33	602.66	0.68
1	50527.69 207	100 Yr	Wellington Nat Res	8070.00	1772.13	1780.66	1780.66	1782.07	0.010477	11.01	1606.33	602.66	0.68
1	50027.69 208	100 Yr	Existing Conditions	8070.00	1768.90	1775.97	1774.63	1776.70	0.006662	8.87	2179.82	722.88	0.64
1	50027.69 208	100 Yr	Wellington Nat Res	8070.00	1768.90	1775.97	1774.63	1776.70	0.006662	8.87	2179.82	722.88	0.64
1	49527.69 209	100 Yr	Existing Conditions	8070.00	1761.98	1770.44	1770.44	1772.56	0.010076	12.87	1189.23	398.17	0.81
1	49527.69 209	100 Yr	Wellington Nat Res	8070.00	1761.98	1770.44	1770.44	1772.56	0.010076	12.87	1189.23	398.17	0.81
1	49027.68 210	100 Yr	Existing Conditions	8070.00	1758.28	1767.25	1767.25	1768.67	0.007740	12.02	1294.00	461.17	0.73
1	49027.68 210	100 Yr	Wellington Nat Res	8070.00	1758.28	1767.25	1767.25	1768.67	0.007740	12.02	1294.00	461.17	0.73
1	48527.67 211	100 Yr	Existing Conditions	8070.00	1754.37	1762.25	1762.21	1763.48	0.009671	12.07	1122.44	346.38	0.79
1	48527.67 211	100 Yr	Wellington Nat Res	8070.00	1754.37	1762.25	1762.21	1763.48	0.009671	12.07	1122.44	346.38	0.79
1	48027.67 212	100 Yr	Existing Conditions	8070.00	1751.01	1756.96	1756.44	1757.54	0.008727	8.06	1435.29	607.88	0.69
1	48027.67 212	100 Yr	Wellington Nat Res	8070.00	1751.01	1756.96	1756.44	1757.54	0.008727	8.06	1435.29	607.88	0.69
1	47527.67 213	100 Yr	Existing Conditions	8070.00	1743.11	1752.90	1752.90	1754.12	0.006016	11.42	1812.50	594.98	0.65
1	47527.67 213	100 Yr	Wellington Nat Res	8070.00	1743.11	1752.90	1752.90	1754.12	0.006016	11.42	1812.50	594.98	0.65
1	47197.53	100 Yr	Existing Conditions	8420.00	1739.26	1750.36	1748.71	1751.26	0.005375	8.97	2072.22	532.18	0.52
1	47197.53	100 Yr	Wellington Nat Res	8420.00	1739.26	1750.36	1748.71	1751.26	0.005375	8.97	2072.22	532.18	0.52
1	47118.37	100 Yr	Existing Conditions	8420.00	1738.76	1749.02	1749.02	1750.66	0.008672	11.89	1599.52	515.10	0.68
1	47118.37	100 Yr	Wellington Nat Res	8420.00	1738.76	1749.02	1749.02	1750.66	0.008672	11.89	1599.52	515.10	0.68
1	46733.22	100 Yr	Existing Conditions	8420.00	1736.33	1747.82	1745.13	1748.34	0.002861	7.02	2058.72	356.10	0.38
1	46733.22	100 Yr	Wellington Nat Res	8420.00	1736.33	1747.82	1745.13	1748.34	0.002861	7.02	2058.72	356.10	0.38
1	46581.2	100 Yr	Existing Conditions	8420.00	1736.33	1746.47	1744.58	1747.57	0.006147	9.47	1594.20	278.73	0.56
1	46581.2	100 Yr	Wellington Nat Res	8420.00	1736.33	1746.47	1744.58	1747.57	0.006147	9.47	1594.20	278.73	0.56
1	46555.71			Inl Struct									
1	46529.91	100 Yr	Existing Conditions	8420.00	1732.25	1746.78	1740.67	1747.45	0.002286	7.19	1943.68	244.69	0.34
1	46529.91	100 Yr	Wellington Nat Res	8420.00	1732.25	1746.78	1740.67	1747.45	0.002286	7.19	1943.68	244.69	0.34
1	46460	100 Yr	Existing Conditions	8420.00	1732.16	1746.53	1741.60	1747.27	0.002375	7.69	1980.35	268.00	0.37
1	46460	100 Yr	Wellington Nat Res	8420.00	1732.16	1746.53	1741.60	1747.27	0.002375	7.69	1980.35	268.00	0.37
1	46348.8	100 Yr	Existing Conditions	8420.00	1731.98	1746.02	1743.47	1746.82	0.004695	9.22	1949.19	305.80	0.49
1	46348.8	100 Yr	Wellington Nat Res	8420.00	1731.98	1746.02	1743.47	1746.82	0.004695	9.22	1949.19	305.80	0.49

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	46286.65			Mult Open									
1	46227.84	100 Yr	Existing Conditions	8420.00	1730.58	1743.86	1741.59	1744.82	0.005222	9.43	1892.22	345.20	0.52
1	46227.84	100 Yr	Wellington Nat Res	8420.00	1730.58	1743.86	1741.59	1744.82	0.005222	9.43	1892.22	345.20	0.52
1	46051.98	100 Yr	Existing Conditions	8420.00	1730.73	1739.15	1739.15	1742.47	0.019581	15.38	727.12	301.86	0.97
1	46051.98	100 Yr	Wellington Nat Res	8420.00	1730.73	1739.15	1739.15	1742.47	0.019581	15.38	727.12	301.86	0.97
1	45886.62	100 Yr	Existing Conditions	8530.00	1730.10	1737.96	1737.48	1739.01	0.010015	10.37	1378.15	364.32	0.68
1	45886.62	100 Yr	Wellington Nat Res	8530.00	1730.10	1737.96	1737.48	1739.01	0.010015	10.37	1378.15	364.32	0.68
1	45738.55	100 Yr	Existing Conditions	8530.00	1729.15	1737.46	1736.21	1737.90	0.003932	6.82	1850.78	394.89	0.44
1	45738.55	100 Yr	Wellington Nat Res	8530.00	1729.15	1737.46	1736.21	1737.90	0.003932	6.82	1850.78	394.89	0.44
1	45444.25 2931	100 Yr	Existing Conditions	8530.00	1724.84	1734.21	1734.21	1735.96	0.013114	12.16	1111.99	409.37	0.80
1	45444.25 2931	100 Yr	Wellington Nat Res	8530.00	1724.84	1734.21	1734.21	1735.96	0.013114	12.16	1111.99	409.37	0.80
1	45091.89	100 Yr	Existing Conditions	9050.00	1722.40	1730.89	1730.76	1732.45	0.013738	13.12	1561.13	395.93	0.83
1	45091.89	100 Yr	Wellington Nat Res	9050.00	1722.40	1730.89	1730.76	1732.45	0.013738	13.12	1561.13	395.93	0.83
1	44954.64	100 Yr	Existing Conditions	9050.00	1721.96	1729.20	1728.72	1730.55	0.012970	11.25	1356.94	474.68	0.77
1	44954.64	100 Yr	Wellington Nat Res	9050.00	1721.96	1729.20	1728.72	1730.55	0.012970	11.25	1356.94	474.68	0.77
1	44674.6	100 Yr	Existing Conditions	9050.00	1719.56	1727.27	1724.63	1727.90	0.006681	8.53	2128.23	593.47	0.57
1	44674.6	100 Yr	Wellington Nat Res	9050.00	1719.56	1727.27	1724.63	1727.90	0.006681	8.53	2128.23	593.47	0.57
1	44260.92	100 Yr	Existing Conditions	9450.00	1714.80	1721.33	1721.33	1722.95	0.026062	13.38	1389.81	441.40	1.06
1	44260.92	100 Yr	Wellington Nat Res	9450.00	1714.80	1721.33	1721.33	1722.95	0.026062	13.38	1389.81	441.40	1.06
1	43730.37	100 Yr	Existing Conditions	9450.00	1709.31	1717.30	1716.00	1718.09	0.008780	9.43	1980.03	469.50	0.64
1	43730.37	100 Yr	Wellington Nat Res	9450.00	1709.31	1717.30	1716.00	1718.09	0.008780	9.43	1980.03	469.50	0.64
1	43286.55	100 Yr	Existing Conditions	9450.00	1700.81	1711.78	1710.77	1713.84	0.010017	12.54	1201.61	255.99	0.72
1	43286.55	100 Yr	Wellington Nat Res	9450.00	1700.81	1711.78	1710.77	1713.84	0.010017	12.54	1201.61	255.99	0.72
1	42794.94	100 Yr	Existing Conditions	9450.00	1696.65	1706.97	1706.97	1709.47	0.012731	13.84	1154.56	483.81	0.81
1	42794.94	100 Yr	Wellington Nat Res	9450.00	1696.65	1706.97	1706.97	1709.47	0.012731	13.84	1154.56	483.81	0.81
1	42389.03	100 Yr	Existing Conditions	9450.00	1694.63	1703.76	1701.07	1704.58	0.005747	8.44	2294.41	554.56	0.54
1	42389.03	100 Yr	Wellington Nat Res	9450.00	1694.63	1703.76	1701.07	1704.58	0.005747	8.44	2294.41	554.56	0.54
1	42201.59	100 Yr	Existing Conditions	9450.00	1691.57	1701.43	1701.43	1703.11	0.009732	12.61	1935.94	562.32	0.72
1	42201.59	100 Yr	Wellington Nat Res	9450.00	1691.57	1701.43	1701.43	1703.11	0.009732	12.61	1935.94	562.32	0.72
1	41976.57	100 Yr	Existing Conditions	9450.00	1685.63	1701.31	1696.86	1701.54	0.001303	5.07	2794.47	551.80	0.26
1	41976.57	100 Yr	Wellington Nat Res	9450.00	1685.63	1701.31	1696.86	1701.54	0.001303	5.07	2794.47	551.80	0.26

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	41942.61			Bridge									
1	41920.29	100 Yr	Existing Conditions	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41920.29	100 Yr	Wellington Nat Res	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41697.86	100 Yr	Existing Conditions	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41697.86	100 Yr	Wellington Nat Res	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41507.15	100 Yr	Existing Conditions	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41507.15	100 Yr	Wellington Nat Res	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41302.8	100 Yr	Existing Conditions	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41302.8	100 Yr	Wellington Nat Res	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41073.56	100 Yr	Existing Conditions	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	41073.56	100 Yr	Wellington Nat Res	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	40734.5	100 Yr	Existing Conditions	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40734.5	100 Yr	Wellington Nat Res	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40361.58	100 Yr	Existing Conditions	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	40361.58	100 Yr	Wellington Nat Res	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	39944.83	100 Yr	Existing Conditions	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39944.83	100 Yr	Wellington Nat Res	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39337.64	100 Yr	Existing Conditions	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	39337.64	100 Yr	Wellington Nat Res	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	38819.33	100 Yr	Existing Conditions	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38819.33	100 Yr	Wellington Nat Res	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38353.44	100 Yr	Existing Conditions	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38353.44	100 Yr	Wellington Nat Res	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38013.46	100 Yr	Existing Conditions	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	38013.46	100 Yr	Wellington Nat Res	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	37612.11	100 Yr	Existing Conditions	9830.00	1646.32	1655.34	1654.51	1657.14	0.010077	11.74	1152.92	272.38	0.80
1	37612.11	100 Yr	Wellington Nat Res	9830.00	1646.32	1655.34	1654.51	1657.14	0.010078	11.74	1152.89	272.38	0.80
1	37267.72	100 Yr	Existing Conditions	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.15	400.78	0.66
1	37267.72	100 Yr	Wellington Nat Res	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.17	400.78	0.66
1	37021.31	100 Yr	Existing Conditions	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80
1	37021.31	100 Yr	Wellington Nat Res	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	36892.31	100 Yr	Existing Conditions	9830.00	1640.58	1649.18	1648.46	1650.65	0.007702	10.28	1152.47	544.85	0.70
1	36892.31	100 Yr	Wellington Nat Res	9830.00	1638.90	1649.35	1647.88	1650.54	0.004753	9.51	1297.00	546.66	0.57
1	36644.6	100 Yr	Existing Conditions	9830.00	1638.53	1647.39	1646.07	1648.80	0.007411	10.21	1336.78	652.49	0.69
1	36644.6	100 Yr	Wellington Nat Res	9830.00	1636.90	1646.33	1646.03	1648.78	0.010090	13.15	1063.59	506.45	0.82
1	36282.06	100 Yr	Existing Conditions	9830.00	1635.58	1644.41	1643.17	1645.86	0.009331	10.44	1307.35	550.21	0.75
1	36282.06	100 Yr	Wellington Nat Res	9830.00	1633.90	1643.22	1642.96	1645.22	0.008868	12.22	1037.51	528.11	0.77
1	35674.92	100 Yr	Existing Conditions	9830.00	1630.58	1638.26	1636.92	1639.58	0.011567	9.95	1435.05	509.85	0.81
1	35674.92	100 Yr	Wellington Nat Res	9830.00	1628.90	1637.94	1637.94	1639.80	0.008987	12.36	1211.15	481.84	0.78
1	35184.46	100 Yr	Existing Conditions	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	35184.46	100 Yr	Wellington Nat Res	9830.00	1624.70	1633.35	1633.35	1635.20	0.010113	12.00	1094.87	437.06	0.80
1	34724.63	100 Yr	Existing Conditions	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34724.63	100 Yr	Wellington Nat Res	9990.00	1619.40	1631.37	1629.00	1632.23	0.003136	8.75	2274.68	600.60	0.48
1	34430.11	100 Yr	Existing Conditions	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34430.11	100 Yr	Wellington Nat Res	9990.00	1616.80	1626.51	1626.51	1630.25	0.013866	15.63	695.68	123.24	0.96
1	34247.12	100 Yr	Existing Conditions	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34247.12	100 Yr	Wellington Nat Res	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34207.13		Bridge										
1	34168.57	100 Yr	Existing Conditions	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	34168.57	100 Yr	Wellington Nat Res	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	33927.21	100 Yr	Existing Conditions	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33927.21	100 Yr	Wellington Nat Res	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33802.04	100 Yr	Existing Conditions	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33802.04	100 Yr	Wellington Nat Res	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33694.16	100 Yr	Existing Conditions	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33694.16	100 Yr	Wellington Nat Res	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33610.52	100 Yr	Existing Conditions	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33610.52	100 Yr	Wellington Nat Res	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33447.2	100 Yr	Existing Conditions	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33447.2	100 Yr	Wellington Nat Res	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33327.3	100 Yr	Existing Conditions	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68
1	33327.3	100 Yr	Wellington Nat Res	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	33137.67	100 Yr	Existing Conditions	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	33137.67	100 Yr	Wellington Nat Res	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	32868.24	100 Yr	Existing Conditions	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32868.24	100 Yr	Wellington Nat Res	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32552.6	100 Yr	Existing Conditions	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32552.6	100 Yr	Wellington Nat Res	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32322.9 2975	100 Yr	Existing Conditions	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	32322.9 2975	100 Yr	Wellington Nat Res	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	31921.77	100 Yr	Existing Conditions	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5684.92	1042.14	0.50
1	31921.77	100 Yr	Wellington Nat Res	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5684.92	1042.14	0.50
1	31504.35	100 Yr	Existing Conditions	22100.00	1593.82	1605.80	1605.48	1607.49	0.004398	13.59	4817.28	1138.04	0.78
1	31504.35	100 Yr	Wellington Nat Res	22100.00	1593.82	1605.80	1605.48	1607.49	0.004398	13.59	4817.28	1138.04	0.78
1	31174.35	100 Yr	Existing Conditions	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	31174.35	100 Yr	Wellington Nat Res	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	30558.18	100 Yr	Existing Conditions	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30558.18	100 Yr	Wellington Nat Res	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30109.75	100 Yr	Existing Conditions	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	30109.75	100 Yr	Wellington Nat Res	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	29696.23	100 Yr	Existing Conditions	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	29696.23	100 Yr	Wellington Nat Res	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	28118.61	100 Yr	Existing Conditions	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	28118.61	100 Yr	Wellington Nat Res	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	27478.04	100 Yr	Existing Conditions	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	27478.04	100 Yr	Wellington Nat Res	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	26847.86	100 Yr	Existing Conditions	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26847.86	100 Yr	Wellington Nat Res	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26215.31 2986	100 Yr	Existing Conditions	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	26215.31 2986	100 Yr	Wellington Nat Res	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	25352.85	100 Yr	Existing Conditions	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25352.85	100 Yr	Wellington Nat Res	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25059.5	100 Yr	Existing Conditions	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79
1	25059.5	100 Yr	Wellington Nat Res	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	24652.63	100 Yr	Existing Conditions	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24652.63	100 Yr	Wellington Nat Res	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24196.99	100 Yr	Existing Conditions	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	24196.99	100 Yr	Wellington Nat Res	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	23552.39	100 Yr	Existing Conditions	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	23552.39	100 Yr	Wellington Nat Res	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	22926.81	100 Yr	Existing Conditions	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22926.81	100 Yr	Wellington Nat Res	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22490.96	100 Yr	Existing Conditions	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	22490.96	100 Yr	Wellington Nat Res	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	21814.55	100 Yr	Existing Conditions	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21814.55	100 Yr	Wellington Nat Res	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21558.83	100 Yr	Existing Conditions	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21558.83	100 Yr	Wellington Nat Res	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21512.55		Bridge										
1	21472.38	100 Yr	Existing Conditions	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21472.38	100 Yr	Wellington Nat Res	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21272.9	100 Yr	Existing Conditions	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21272.9	100 Yr	Wellington Nat Res	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21023.87	100 Yr	Existing Conditions	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	21023.87	100 Yr	Wellington Nat Res	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	20756.42	100 Yr	Existing Conditions	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20756.42	100 Yr	Wellington Nat Res	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20469.79	100 Yr	Existing Conditions	23100.00	1525.07	1538.70	1538.57	1541.52	0.003845	14.49	3546.73	922.37	0.75
1	20469.79	100 Yr	Wellington Nat Res	23100.00	1525.07	1538.70	1538.57	1541.52	0.003845	14.49	3546.73	922.37	0.75
1	20244.22	100 Yr	Existing Conditions	23100.00	1525.47	1538.77	1537.38	1540.22	0.001949	11.05	4952.52	960.69	0.55
1	20244.22	100 Yr	Wellington Nat Res	23100.00	1525.47	1538.77	1537.38	1540.22	0.001949	11.05	4952.52	960.69	0.55
1	20211.1		Bridge										
1	20178.31	100 Yr	Existing Conditions	23100.00	1524.32	1536.78	1536.78	1539.28	0.003567	13.98	3838.46	909.16	0.73
1	20178.31	100 Yr	Wellington Nat Res	23100.00	1524.32	1536.78	1536.78	1539.28	0.003567	13.98	3838.46	909.16	0.73



HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	19969.12	100 Yr	Existing Conditions	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19969.12	100 Yr	Wellington Nat Res	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19810.17	100 Yr	Existing Conditions	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19810.17	100 Yr	Wellington Nat Res	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19169.45	100 Yr	Existing Conditions	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	19169.45	100 Yr	Wellington Nat Res	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	18531.66	100 Yr	Existing Conditions	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	18531.66	100 Yr	Wellington Nat Res	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	17960.92	100 Yr	Existing Conditions	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17960.92	100 Yr	Wellington Nat Res	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17258.82	100 Yr	Existing Conditions	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	17258.82	100 Yr	Wellington Nat Res	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	16682.16	100 Yr	Existing Conditions	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16682.16	100 Yr	Wellington Nat Res	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16252.2	100 Yr	Existing Conditions	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	16252.2	100 Yr	Wellington Nat Res	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	15837.86	100 Yr	Existing Conditions	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15837.86	100 Yr	Wellington Nat Res	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15420.14	100 Yr	Existing Conditions	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	15420.14	100 Yr	Wellington Nat Res	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	14922.03	100 Yr	Existing Conditions	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14922.03	100 Yr	Wellington Nat Res	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14691.12	100 Yr	Existing Conditions	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14691.12	100 Yr	Wellington Nat Res	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14318.94	100 Yr	Existing Conditions	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	14318.94	100 Yr	Wellington Nat Res	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	13644.12	100 Yr	Existing Conditions	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	13644.12	100 Yr	Wellington Nat Res	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	12869.51	100 Yr	Existing Conditions	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12869.51	100 Yr	Wellington Nat Res	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12234	100 Yr	Existing Conditions	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53
1	12234	100 Yr	Wellington Nat Res	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	11498.04	100 Yr	Existing Conditions	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11498.04	100 Yr	Wellington Nat Res	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11273.88	100 Yr	Existing Conditions	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	11273.88	100 Yr	Wellington Nat Res	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	10834.88	100 Yr	Existing Conditions	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10834.88	100 Yr	Wellington Nat Res	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10323.01	100 Yr	Existing Conditions	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	10323.01	100 Yr	Wellington Nat Res	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	9660.539	100 Yr	Existing Conditions	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	9660.539	100 Yr	Wellington Nat Res	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	8871.451	100 Yr	Existing Conditions	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8871.451	100 Yr	Wellington Nat Res	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8240.325	100 Yr	Existing Conditions	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	8240.325	100 Yr	Wellington Nat Res	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	7746.589	100 Yr	Existing Conditions	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7746.589	100 Yr	Wellington Nat Res	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7095.764	100 Yr	Existing Conditions	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	7095.764	100 Yr	Wellington Nat Res	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	6615.735	100 Yr	Existing Conditions	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6615.735	100 Yr	Wellington Nat Res	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6072.811	100 Yr	Existing Conditions	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	6072.811	100 Yr	Wellington Nat Res	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	5545.166	100 Yr	Existing Conditions	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5545.166	100 Yr	Wellington Nat Res	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5139.7	100 Yr	Existing Conditions	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	5139.7	100 Yr	Wellington Nat Res	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	4667.436	100 Yr	Existing Conditions	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4667.436	100 Yr	Wellington Nat Res	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4475.51	100 Yr	Existing Conditions	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4475.51	100 Yr	Wellington Nat Res	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4282.712	100 Yr	Existing Conditions	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	4282.712	100 Yr	Wellington Nat Res	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46
1	4102.991	100 Yr	Existing Conditions	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	4102.991	100 Yr	Wellington Nat Res	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	3949.696	100 Yr	Existing Conditions	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3949.696	100 Yr	Wellington Nat Res	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3749.133	100 Yr	Existing Conditions	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3749.133	100 Yr	Wellington Nat Res	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3601.239	100 Yr	Existing Conditions	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3601.239	100 Yr	Wellington Nat Res	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3340.424	100 Yr	Existing Conditions	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	3340.424	100 Yr	Wellington Nat Res	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	2882.748 3039	100 Yr	Existing Conditions	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2882.748 3039	100 Yr	Wellington Nat Res	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2502.781	100 Yr	Existing Conditions	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66
1	2502.781	100 Yr	Wellington Nat Res	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66

## ALTERNATIVE 6

Hunter Road and Hunter Road Bridge

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr

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
1	51162.24 206	100 Yr	Hunter Rd rev ex	8070.00	1777.98	1787.30	1787.04	1789.39	0.011975	12.79	911.98	195.44	0.75
1	51162.24 206	100 Yr	Hunter Prop Raise Rd	8070.00	1777.98	1787.30	1787.04	1789.39	0.011975	12.79	911.98	195.44	0.75
1	50527.69 207	100 Yr	Hunter Rd rev ex	8070.00	1772.13	1780.66	1780.66	1782.07	0.010477	11.01	1606.33	602.66	0.68
1	50527.69 207	100 Yr	Hunter Prop Raise Rd	8070.00	1772.13	1780.66	1780.66	1782.07	0.010477	11.01	1606.33	602.66	0.68
1	50027.69 208	100 Yr	Hunter Rd rev ex	8070.00	1768.90	1775.97	1774.63	1776.70	0.006662	8.87	2179.82	722.88	0.64
1	50027.69 208	100 Yr	Hunter Prop Raise Rd	8070.00	1768.90	1775.97	1774.63	1776.70	0.006662	8.87	2179.82	722.88	0.64
1	49527.69 209	100 Yr	Hunter Rd rev ex	8070.00	1761.98	1770.44	1770.44	1772.56	0.010076	12.87	1189.23	398.17	0.81
1	49527.69 209	100 Yr	Hunter Prop Raise Rd	8070.00	1761.98	1770.44	1770.44	1772.56	0.010076	12.87	1189.23	398.17	0.81
1	49027.68 210	100 Yr	Hunter Rd rev ex	8070.00	1758.28	1767.25	1767.25	1768.67	0.007740	12.02	1294.00	461.17	0.73
1	49027.68 210	100 Yr	Hunter Prop Raise Rd	8070.00	1758.28	1767.25	1767.25	1768.67	0.007740	12.02	1294.00	461.17	0.73
1	48527.67 211	100 Yr	Hunter Rd rev ex	8070.00	1754.37	1762.25	1762.21	1763.48	0.009671	12.07	1122.44	346.38	0.79
1	48527.67 211	100 Yr	Hunter Prop Raise Rd	8070.00	1754.37	1762.25	1762.21	1763.48	0.009671	12.07	1122.44	346.38	0.79
1	48027.67 212	100 Yr	Hunter Rd rev ex	8070.00	1751.01	1756.96	1756.44	1757.54	0.008727	8.06	1435.29	607.88	0.69
1	48027.67 212	100 Yr	Hunter Prop Raise Rd	8070.00	1751.01	1756.96	1756.44	1757.54	0.008727	8.06	1435.29	607.88	0.69
1	47527.67 213	100 Yr	Hunter Rd rev ex	8070.00	1743.11	1752.90	1752.90	1754.12	0.006016	11.42	1812.50	594.98	0.65
1	47527.67 213	100 Yr	Hunter Prop Raise Rd	8070.00	1743.11	1752.90	1752.90	1754.12	0.006016	11.42	1812.50	594.98	0.65
1	47197.53	100 Yr	Hunter Rd rev ex	8420.00	1739.26	1750.36	1748.71	1751.26	0.005375	8.97	2072.22	532.18	0.52
1	47197.53	100 Yr	Hunter Prop Raise Rd	8420.00	1739.26	1750.36	1748.71	1751.26	0.005375	8.97	2072.22	532.18	0.52
1	47118.37	100 Yr	Hunter Rd rev ex	8420.00	1738.76	1749.02	1749.02	1750.66	0.008672	11.89	1599.52	515.10	0.68
1	47118.37	100 Yr	Hunter Prop Raise Rd	8420.00	1738.76	1749.02	1749.02	1750.66	0.008672	11.89	1599.52	515.10	0.68
1	46733.22	100 Yr	Hunter Rd rev ex	8420.00	1736.33	1747.82	1745.13	1748.34	0.002861	7.02	2058.72	356.10	0.38
1	46733.22	100 Yr	Hunter Prop Raise Rd	8420.00	1736.33	1747.82	1745.13	1748.34	0.002861	7.02	2058.72	356.10	0.38
1	46581.2	100 Yr	Hunter Rd rev ex	8420.00	1736.33	1746.47	1744.58	1747.57	0.006148	9.47	1594.13	278.73	0.56
1	46581.2	100 Yr	Hunter Prop Raise Rd	8420.00	1736.33	1746.47	1744.58	1747.57	0.006148	9.47	1594.13	278.73	0.56
1	46555.71			Inl Struct									
1	46529.91	100 Yr	Hunter Rd rev ex	8420.00	1732.25	1746.78	1740.67	1747.45	0.002286	7.19	1943.62	244.69	0.34
1	46529.91	100 Yr	Hunter Prop Raise Rd	8420.00	1732.25	1746.78	1740.67	1747.45	0.002286	7.19	1943.62	244.69	0.34
1	46460	100 Yr	Hunter Rd rev ex	8420.00	1732.16	1746.53	1741.60	1747.27	0.002375	7.69	1980.25	268.00	0.37
1	46460	100 Yr	Hunter Prop Raise Rd	8420.00	1732.16	1746.53	1741.60	1747.27	0.002375	7.69	1980.25	268.00	0.37
1	46348.8	100 Yr	Hunter Rd rev ex	8420.00	1731.98	1746.02	1743.47	1746.82	0.004696	9.22	1949.00	305.80	0.49
1	46348.8	100 Yr	Hunter Prop Raise Rd	8420.00	1731.98	1746.02	1743.47	1746.82	0.004696	9.22	1949.00	305.80	0.49

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	46286.65			Mult Open									
1	46227.84	100 Yr	Hunter Rd rev ex	8420.00	1730.58	1743.86	1741.59	1744.82	0.005222	9.43	1892.22	345.20	0.52
1	46227.84	100 Yr	Hunter Prop Raise Rd	8420.00	1730.58	1743.86	1741.59	1744.82	0.005222	9.43	1892.22	345.20	0.52
1	46051.98	100 Yr	Hunter Rd rev ex	8420.00	1730.73	1739.15	1739.15	1742.47	0.019581	15.38	727.12	301.86	0.97
1	46051.98	100 Yr	Hunter Prop Raise Rd	8420.00	1730.73	1739.15	1739.15	1742.47	0.019581	15.38	727.12	301.86	0.97
1	45886.62	100 Yr	Hunter Rd rev ex	8530.00	1730.10	1737.96	1737.48	1739.01	0.010015	10.37	1378.15	364.32	0.68
1	45886.62	100 Yr	Hunter Prop Raise Rd	8530.00	1730.10	1737.96	1737.48	1739.01	0.010015	10.37	1378.15	364.32	0.68
1	45738.55	100 Yr	Hunter Rd rev ex	8530.00	1729.15	1737.46	1736.21	1737.90	0.003932	6.82	1850.78	394.89	0.44
1	45738.55	100 Yr	Hunter Prop Raise Rd	8530.00	1729.15	1737.46	1736.21	1737.90	0.003932	6.82	1850.78	394.89	0.44
1	45444.25 2931	100 Yr	Hunter Rd rev ex	8530.00	1724.84	1734.21	1734.21	1735.96	0.013114	12.16	1111.99	409.37	0.80
1	45444.25 2931	100 Yr	Hunter Prop Raise Rd	8530.00	1724.84	1734.21	1734.21	1735.96	0.013114	12.16	1111.99	409.37	0.80
1	45091.89	100 Yr	Hunter Rd rev ex	9050.00	1722.40	1730.89	1730.76	1732.45	0.013738	13.12	1561.13	395.93	0.83
1	45091.89	100 Yr	Hunter Prop Raise Rd	9050.00	1722.40	1730.89	1730.76	1732.45	0.013738	13.12	1561.13	395.93	0.83
1	44954.64	100 Yr	Hunter Rd rev ex	9050.00	1721.96	1729.20	1728.72	1730.55	0.012970	11.25	1356.94	474.68	0.77
1	44954.64	100 Yr	Hunter Prop Raise Rd	9050.00	1721.96	1729.20	1728.72	1730.55	0.012970	11.25	1356.94	474.68	0.77
1	44674.6	100 Yr	Hunter Rd rev ex	9050.00	1719.56	1727.27	1724.63	1727.90	0.006681	8.53	2128.23	593.47	0.57
1	44674.6	100 Yr	Hunter Prop Raise Rd	9050.00	1719.56	1727.27	1724.63	1727.90	0.006681	8.53	2128.23	593.47	0.57
1	44260.92	100 Yr	Hunter Rd rev ex	9450.00	1714.80	1721.33	1721.33	1722.95	0.026062	13.38	1389.81	441.40	1.06
1	44260.92	100 Yr	Hunter Prop Raise Rd	9450.00	1714.80	1721.33	1721.33	1722.95	0.026062	13.38	1389.81	441.40	1.06
1	43730.37	100 Yr	Hunter Rd rev ex	9450.00	1709.31	1717.30	1716.00	1718.09	0.008780	9.43	1980.03	469.50	0.64
1	43730.37	100 Yr	Hunter Prop Raise Rd	9450.00	1709.31	1717.30	1716.00	1718.09	0.008780	9.43	1980.03	469.50	0.64
1	43286.55	100 Yr	Hunter Rd rev ex	9450.00	1700.81	1711.78	1710.77	1713.84	0.010017	12.54	1201.61	255.99	0.72
1	43286.55	100 Yr	Hunter Prop Raise Rd	9450.00	1700.81	1711.78	1710.77	1713.84	0.010017	12.54	1201.61	255.99	0.72
1	42794.94	100 Yr	Hunter Rd rev ex	9450.00	1696.65	1706.97	1706.97	1709.47	0.012731	13.84	1154.56	483.81	0.81
1	42794.94	100 Yr	Hunter Prop Raise Rd	9450.00	1696.65	1706.97	1706.97	1709.47	0.012731	13.84	1154.56	483.81	0.81
1	42389.03	100 Yr	Hunter Rd rev ex	9450.00	1694.63	1703.76	1701.07	1704.58	0.005747	8.44	2294.41	554.56	0.54
1	42389.03	100 Yr	Hunter Prop Raise Rd	9450.00	1694.63	1703.76	1701.07	1704.58	0.005747	8.44	2294.41	554.56	0.54
1	42201.59	100 Yr	Hunter Rd rev ex	9450.00	1691.57	1701.43	1701.43	1703.11	0.009732	12.61	1935.94	562.32	0.72
1	42201.59	100 Yr	Hunter Prop Raise Rd	9450.00	1691.57	1701.43	1701.43	1703.11	0.009732	12.61	1935.94	562.32	0.72
1	41976.57	100 Yr	Hunter Rd rev ex	9450.00	1685.63	1701.31	1696.86	1701.54	0.001303	5.07	2794.47	551.80	0.26
1	41976.57	100 Yr	Hunter Prop Raise Rd	9450.00	1685.63	1701.31	1696.86	1701.54	0.001303	5.07	2794.47	551.80	0.26

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	41942.61			Bridge									
1	41920.29	100 Yr	Hunter Rd rev ex	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41920.29	100 Yr	Hunter Prop Raise Rd	9450.00	1685.56	1698.65	1697.82	1699.58	0.007257	10.12	1882.39	598.43	0.60
1	41697.86	100 Yr	Hunter Rd rev ex	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41697.86	100 Yr	Hunter Prop Raise Rd	9450.00	1687.43	1698.00	1695.98	1698.65	0.004581	8.73	2413.46	666.62	0.49
1	41507.15	100 Yr	Hunter Rd rev ex	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41507.15	100 Yr	Hunter Prop Raise Rd	9510.00	1686.10	1695.80	1695.80	1697.46	0.007740	11.81	1412.55	629.94	0.71
1	41302.8	100 Yr	Hunter Rd rev ex	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41302.8	100 Yr	Hunter Prop Raise Rd	9510.00	1683.03	1693.94	1693.36	1695.16	0.004699	10.41	1593.28	603.09	0.58
1	41073.56	100 Yr	Hunter Rd rev ex	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	41073.56	100 Yr	Hunter Prop Raise Rd	9510.00	1679.64	1690.15	1690.15	1693.38	0.011392	15.35	946.40	446.33	0.89
1	40734.5	100 Yr	Hunter Rd rev ex	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40734.5	100 Yr	Hunter Prop Raise Rd	9510.00	1676.38	1685.47	1685.45	1688.54	0.012183	14.63	862.76	203.61	0.89
1	40361.58	100 Yr	Hunter Rd rev ex	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	40361.58	100 Yr	Hunter Prop Raise Rd	9510.00	1672.18	1682.97	1682.97	1685.10	0.008236	12.99	1322.35	948.48	0.75
1	39944.83	100 Yr	Hunter Rd rev ex	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39944.83	100 Yr	Hunter Prop Raise Rd	9510.00	1667.53	1677.38	1677.30	1678.88	0.009083	11.65	1392.24	704.97	0.76
1	39337.64	100 Yr	Hunter Rd rev ex	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	39337.64	100 Yr	Hunter Prop Raise Rd	9510.00	1660.72	1672.17	1671.57	1673.73	0.008213	10.55	1347.34	607.72	0.72
1	38819.33	100 Yr	Hunter Rd rev ex	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38819.33	100 Yr	Hunter Prop Raise Rd	9830.00	1657.15	1666.93	1666.93	1669.05	0.009723	12.88	1392.29	370.85	0.81
1	38353.44	100 Yr	Hunter Rd rev ex	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38353.44	100 Yr	Hunter Prop Raise Rd	9830.00	1653.96	1661.53	1661.53	1663.83	0.015374	13.55	1161.63	384.16	0.96
1	38013.46	100 Yr	Hunter Rd rev ex	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	38013.46	100 Yr	Hunter Prop Raise Rd	9830.00	1650.52	1659.06	1657.59	1660.28	0.006092	9.51	1501.71	365.77	0.63
1	37612.11	100 Yr	Hunter Rd rev ex	9830.00	1646.32	1655.34	1654.51	1657.14	0.010077	11.74	1152.92	272.38	0.80
1	37612.11	100 Yr	Hunter Prop Raise Rd	9830.00	1646.32	1655.34	1654.51	1657.14	0.010077	11.74	1152.92	272.38	0.80
1	37267.72	100 Yr	Hunter Rd rev ex	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.15	400.78	0.66
1	37267.72	100 Yr	Hunter Prop Raise Rd	9830.00	1643.64	1652.82	1651.21	1654.30	0.006438	10.66	1299.15	400.78	0.66
1	37021.31	100 Yr	Hunter Rd rev ex	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80
1	37021.31	100 Yr	Hunter Prop Raise Rd	9830.00	1641.64	1650.36	1650.36	1652.27	0.010153	11.83	1179.12	407.38	0.80

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	36892.31	100 Yr	Hunter Rd rev ex	9830.00	1640.58	1649.18	1648.46	1650.65	0.007702	10.28	1152.47	544.85	0.70
1	36892.31	100 Yr	Hunter Prop Raise Rd	9830.00	1640.58	1649.18	1648.46	1650.65	0.007702	10.28	1152.47	544.85	0.70
1	36644.6	100 Yr	Hunter Rd rev ex	9830.00	1638.53	1647.39	1646.07	1648.80	0.007411	10.21	1336.78	652.49	0.69
1	36644.6	100 Yr	Hunter Prop Raise Rd	9830.00	1638.53	1647.39	1646.07	1648.80	0.007411	10.21	1336.78	652.49	0.69
1	36282.06	100 Yr	Hunter Rd rev ex	9830.00	1635.58	1644.41	1643.17	1645.86	0.009331	10.44	1307.35	550.21	0.75
1	36282.06	100 Yr	Hunter Prop Raise Rd	9830.00	1635.58	1644.41	1643.17	1645.86	0.009331	10.44	1307.35	550.21	0.75
1	35674.92	100 Yr	Hunter Rd rev ex	9830.00	1630.58	1638.26	1636.92	1639.58	0.011567	9.95	1435.05	509.85	0.81
1	35674.92	100 Yr	Hunter Prop Raise Rd	9830.00	1630.58	1638.26	1636.92	1639.58	0.011567	9.95	1435.05	509.85	0.81
1	35184.46	100 Yr	Hunter Rd rev ex	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	35184.46	100 Yr	Hunter Prop Raise Rd	9830.00	1624.81	1633.89	1632.95	1635.18	0.007982	9.33	1325.82	500.95	0.69
1	34724.63	100 Yr	Hunter Rd rev ex	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34724.63	100 Yr	Hunter Prop Raise Rd	9990.00	1621.20	1632.59	1629.35	1633.16	0.002470	7.52	2683.03	624.46	0.42
1	34430.11	100 Yr	Hunter Rd rev ex	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34430.11	100 Yr	Hunter Prop Raise Rd	9990.00	1617.75	1628.33	1628.33	1631.58	0.010403	15.07	950.03	379.12	0.86
1	34247.12	100 Yr	Hunter Rd rev ex	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34247.12	100 Yr	Hunter Prop Raise Rd	9990.00	1616.24	1625.39	1624.02	1627.04	0.007965	10.31	976.28	409.71	0.71
1	34207.13		Bridge										
1	34168.57	100 Yr	Hunter Rd rev ex	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	34168.57	100 Yr	Hunter Prop Raise Rd	9990.00	1615.58	1624.90	1623.52	1626.55	0.007886	10.31	977.62	542.20	0.70
1	33927.21	100 Yr	Hunter Rd rev ex	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33927.21	100 Yr	Hunter Prop Raise Rd	9990.00	1613.02	1622.35	1622.35	1624.38	0.009300	12.09	1119.60	384.35	0.77
1	33802.04	100 Yr	Hunter Rd rev ex	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33802.04	100 Yr	Hunter Prop Raise Rd	10000.00	1612.01	1621.50	1621.14	1622.93	0.006587	10.65	1387.34	952.09	0.66
1	33694.16	100 Yr	Hunter Rd rev ex	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33694.16	100 Yr	Hunter Prop Raise Rd	10000.00	1610.77	1621.55	1620.30	1622.29	0.003206	8.48	2068.75	993.52	0.48
1	33610.52	100 Yr	Hunter Rd rev ex	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33610.52	100 Yr	Hunter Prop Raise Rd	21800.00	1610.26	1620.74	1619.97	1621.81	0.005343	10.87	3694.63	928.26	0.62
1	33447.2	100 Yr	Hunter Rd rev ex	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33447.2	100 Yr	Hunter Prop Raise Rd	21800.00	1607.87	1619.38	1619.11	1620.82	0.007554	13.03	3348.91	855.10	0.73
1	33327.3	100 Yr	Hunter Rd rev ex	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68
1	33327.3	100 Yr	Hunter Prop Raise Rd	21800.00	1607.16	1618.74	1617.82	1619.90	0.006431	12.12	3992.27	982.52	0.68



HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	33137.67	100 Yr	Hunter Rd rev ex	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	33137.67	100 Yr	Hunter Prop Raise Rd	21800.00	1606.25	1616.14	1616.12	1618.15	0.012775	15.74	3121.81	863.53	0.93
1	32868.24	100 Yr	Hunter Rd rev ex	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32868.24	100 Yr	Hunter Prop Raise Rd	21800.00	1603.83	1614.43	1613.24	1615.33	0.006380	11.67	4024.88	849.45	0.67
1	32552.6	100 Yr	Hunter Rd rev ex	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32552.6	100 Yr	Hunter Prop Raise Rd	21800.00	1599.58	1612.42	1611.28	1613.52	0.004495	10.64	4945.75	1082.35	0.57
1	32322.9 2975	100 Yr	Hunter Rd rev ex	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	32322.9 2975	100 Yr	Hunter Prop Raise Rd	22100.00	1596.79	1610.28	1610.28	1612.07	0.008525	13.23	3994.07	1024.44	0.77
1	31921.77	100 Yr	Hunter Rd rev ex	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5684.92	1042.14	0.50
1	31921.77	100 Yr	Hunter Prop Raise Rd	22100.00	1595.30	1608.69	1605.57	1609.28	0.003731	8.39	5684.92	1042.14	0.50
1	31504.35	100 Yr	Hunter Rd rev ex	22100.00	1593.82	1605.80	1605.48	1607.49	0.004398	13.59	4817.28	1138.04	0.78
1	31504.35	100 Yr	Hunter Prop Raise Rd	22100.00	1593.82	1605.80	1605.48	1607.49	0.004398	13.59	4817.28	1138.04	0.78
1	31174.35	100 Yr	Hunter Rd rev ex	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	31174.35	100 Yr	Hunter Prop Raise Rd	22100.00	1592.04	1603.51	1603.51	1605.75	0.006102	15.31	4007.64	960.96	0.91
1	30558.18	100 Yr	Hunter Rd rev ex	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30558.18	100 Yr	Hunter Prop Raise Rd	22100.00	1587.71	1598.70	1598.70	1600.72	0.006244	12.42	3317.34	960.71	0.87
1	30109.75	100 Yr	Hunter Rd rev ex	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	30109.75	100 Yr	Hunter Prop Raise Rd	22100.00	1586.31	1595.45	1595.45	1597.39	0.006817	14.75	4376.62	1259.07	0.94
1	29696.23	100 Yr	Hunter Rd rev ex	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	29696.23	100 Yr	Hunter Prop Raise Rd	22100.00	1584.16	1594.34	1592.00	1594.79	0.002244	7.03	7142.10	1326.78	0.52
1	28118.61	100 Yr	Hunter Rd rev ex	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	28118.61	100 Yr	Hunter Prop Raise Rd	22100.00	1576.47	1587.59	1587.59	1589.82	0.005071	14.52	4274.38	1117.31	0.84
1	27478.04	100 Yr	Hunter Rd rev ex	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	27478.04	100 Yr	Hunter Prop Raise Rd	22200.00	1571.21	1582.46	1580.93	1583.88	0.003456	10.49	4234.34	888.01	0.67
1	26847.86	100 Yr	Hunter Rd rev ex	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26847.86	100 Yr	Hunter Prop Raise Rd	22500.00	1566.07	1579.51	1578.05	1581.60	0.005923	12.77	3825.74	1422.27	0.66
1	26215.31 2986	100 Yr	Hunter Rd rev ex	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	26215.31 2986	100 Yr	Hunter Prop Raise Rd	22500.00	1564.22	1575.43	1574.55	1576.82	0.009223	13.67	4984.73	1529.52	0.79
1	25352.85	100 Yr	Hunter Rd rev ex	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25352.85	100 Yr	Hunter Prop Raise Rd	22500.00	1558.16	1571.67	1570.10	1572.51	0.003999	9.93	7200.39	1574.40	0.54
1	25059.5	100 Yr	Hunter Rd rev ex	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79
1	25059.5	100 Yr	Hunter Prop Raise Rd	22500.00	1555.79	1568.58	1568.58	1570.87	0.008486	14.37	4460.35	1398.02	0.79

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	24652.63	100 Yr	Hunter Rd rev ex	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24652.63	100 Yr	Hunter Prop Raise Rd	22800.00	1552.48	1565.83	1565.23	1567.78	0.006070	13.65	4163.58	1185.12	0.68
1	24196.99	100 Yr	Hunter Rd rev ex	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	24196.99	100 Yr	Hunter Prop Raise Rd	23000.00	1551.94	1563.33	1560.55	1564.89	0.006053	11.44	3785.79	1182.24	0.65
1	23552.39	100 Yr	Hunter Rd rev ex	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	23552.39	100 Yr	Hunter Prop Raise Rd	23000.00	1546.82	1558.69	1557.50	1560.50	0.007712	13.06	3349.65	1147.40	0.74
1	22926.81	100 Yr	Hunter Rd rev ex	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22926.81	100 Yr	Hunter Prop Raise Rd	23000.00	1542.83	1555.46	1553.43	1556.61	0.004910	8.85	3160.40	1254.22	0.57
1	22490.96	100 Yr	Hunter Rd rev ex	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	22490.96	100 Yr	Hunter Prop Raise Rd	23000.00	1541.73	1551.07	1550.84	1553.26	0.012710	12.04	2308.66	1144.83	0.87
1	21814.55	100 Yr	Hunter Rd rev ex	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21814.55	100 Yr	Hunter Prop Raise Rd	23000.00	1536.76	1547.34	1545.44	1547.94	0.004549	7.46	5713.38	1704.64	0.53
1	21558.83	100 Yr	Hunter Rd rev ex	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21558.83	100 Yr	Hunter Prop Raise Rd	23000.00	1534.22	1546.51	1544.02	1546.94	0.002532	6.86	7557.74	1668.76	0.41
1	21512.55			Bridge									
1	21472.38	100 Yr	Hunter Rd rev ex	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21472.38	100 Yr	Hunter Prop Raise Rd	23000.00	1533.06	1545.56	1543.28	1546.16	0.003634	8.15	7163.13	1617.86	0.50
1	21272.9	100 Yr	Hunter Rd rev ex	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21272.9	100 Yr	Hunter Prop Raise Rd	23000.00	1532.08	1545.16	1542.05	1545.59	0.002047	6.89	8998.44	1454.67	0.38
1	21023.87	100 Yr	Hunter Rd rev ex	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	21023.87	100 Yr	Hunter Prop Raise Rd	23100.00	1529.50	1543.63	1542.22	1544.90	0.004392	11.20	6194.18	1279.97	0.57
1	20756.42	100 Yr	Hunter Rd rev ex	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20756.42	100 Yr	Hunter Prop Raise Rd	23100.00	1526.04	1540.58	1540.58	1543.24	0.007406	14.40	3595.90	1093.46	0.74
1	20469.79	100 Yr	Hunter Rd rev ex	23100.00	1525.07	1538.79	1538.79	1541.52	0.003697	14.28	3634.51	926.15	0.73
1	20469.79	100 Yr	Hunter Prop Raise Rd	23100.00	1525.07	1538.79	1538.79	1541.52	0.003697	14.28	3634.51	926.15	0.73
1	20244.22	100 Yr	Hunter Rd rev ex	23100.00	1525.47	1537.33	1537.33	1539.79	0.003544	13.75	3678.27	927.32	0.72
1	20244.22	100 Yr	Hunter Prop Raise Rd	23100.00	1525.47	1537.79	1537.33	1539.85	0.002885	12.75	4100.32	938.77	0.66
1	20211.1			Mult Open									
1	20178.31	100 Yr	Hunter Rd rev ex	23100.00	1524.32	1536.76	1536.76	1539.25	0.003573	13.97	3840.94	908.93	0.73
1	20178.31	100 Yr	Hunter Prop Raise Rd	23100.00	1524.32	1536.76	1536.76	1539.25	0.003573	13.97	3840.94	908.93	0.73

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	19969.12	100 Yr	Hunter Rd rev ex	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19969.12	100 Yr	Hunter Prop Raise Rd	23100.00	1524.94	1534.93	1534.93	1537.37	0.005487	14.32	3479.61	883.69	0.86
1	19810.17	100 Yr	Hunter Rd rev ex	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19810.17	100 Yr	Hunter Prop Raise Rd	23500.00	1524.90	1534.31	1534.15	1536.39	0.005301	13.62	3950.04	949.85	0.84
1	19169.45	100 Yr	Hunter Rd rev ex	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	19169.45	100 Yr	Hunter Prop Raise Rd	23500.00	1523.91	1530.66	1530.66	1532.10	0.007971	11.87	4280.64	1309.46	0.95
1	18531.66	100 Yr	Hunter Rd rev ex	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	18531.66	100 Yr	Hunter Prop Raise Rd	23500.00	1517.90	1528.20	1525.67	1528.76	0.001776	7.08	6974.98	1416.22	0.47
1	17960.92	100 Yr	Hunter Rd rev ex	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17960.92	100 Yr	Hunter Prop Raise Rd	23600.00	1512.55	1526.31	1525.23	1527.53	0.002851	11.08	6322.73	1323.15	0.63
1	17258.82	100 Yr	Hunter Rd rev ex	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	17258.82	100 Yr	Hunter Prop Raise Rd	23600.00	1507.30	1521.45	1521.45	1524.74	0.005057	17.49	3610.74	756.32	0.87
1	16682.16	100 Yr	Hunter Rd rev ex	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16682.16	100 Yr	Hunter Prop Raise Rd	23600.00	1504.88	1519.17	1517.88	1521.84	0.003180	13.85	2944.76	925.96	0.70
1	16252.2	100 Yr	Hunter Rd rev ex	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	16252.2	100 Yr	Hunter Prop Raise Rd	23600.00	1503.94	1516.71	1516.71	1520.14	0.004594	16.04	2901.61	758.00	0.83
1	15837.86	100 Yr	Hunter Rd rev ex	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15837.86	100 Yr	Hunter Prop Raise Rd	23600.00	1503.96	1515.63	1514.16	1516.91	0.002497	11.14	4301.64	853.58	0.60
1	15420.14	100 Yr	Hunter Rd rev ex	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	15420.14	100 Yr	Hunter Prop Raise Rd	23600.00	1497.72	1512.96	1512.96	1515.65	0.003288	15.36	3465.93	637.62	0.72
1	14922.03	100 Yr	Hunter Rd rev ex	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14922.03	100 Yr	Hunter Prop Raise Rd	23600.00	1492.54	1507.56	1506.16	1510.80	0.004166	14.66	2088.26	439.02	0.78
1	14691.12	100 Yr	Hunter Rd rev ex	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14691.12	100 Yr	Hunter Prop Raise Rd	23600.00	1493.44	1507.76	1504.20	1509.76	0.002147	11.65	2841.49	414.47	0.57
1	14318.94	100 Yr	Hunter Rd rev ex	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	14318.94	100 Yr	Hunter Prop Raise Rd	23600.00	1490.65	1503.66	1503.44	1508.23	0.006407	17.41	1746.28	315.42	0.96
1	13644.12	100 Yr	Hunter Rd rev ex	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	13644.12	100 Yr	Hunter Prop Raise Rd	23700.00	1489.59	1502.39	1500.18	1504.52	0.003214	11.80	2186.45	253.17	0.67
1	12869.51	100 Yr	Hunter Rd rev ex	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12869.51	100 Yr	Hunter Prop Raise Rd	23700.00	1483.16	1500.78	1496.44	1502.56	0.001862	10.74	2367.18	210.13	0.53
1	12234	100 Yr	Hunter Rd rev ex	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53
1	12234	100 Yr	Hunter Prop Raise Rd	23700.00	1479.05	1499.01	1493.20	1501.39	0.001642	12.57	2279.78	204.48	0.53

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	11498.04	100 Yr	Hunter Rd rev ex	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11498.04	100 Yr	Hunter Prop Raise Rd	23700.00	1475.38	1491.84	1491.84	1498.83	0.006072	21.89	1425.65	116.23	1.00
1	11273.88	100 Yr	Hunter Rd rev ex	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	11273.88	100 Yr	Hunter Prop Raise Rd	23800.00	1474.14	1491.19	1489.23	1495.59	0.003971	16.88	1502.48	120.97	0.79
1	10834.88	100 Yr	Hunter Rd rev ex	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10834.88	100 Yr	Hunter Prop Raise Rd	23800.00	1473.97	1487.83	1487.83	1493.26	0.006720	19.03	1511.94	167.91	1.00
1	10323.01	100 Yr	Hunter Rd rev ex	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	10323.01	100 Yr	Hunter Prop Raise Rd	23800.00	1471.61	1485.13	1485.13	1489.63	0.005946	17.22	1686.30	262.93	0.93
1	9660.539	100 Yr	Hunter Rd rev ex	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	9660.539	100 Yr	Hunter Prop Raise Rd	23800.00	1469.84	1482.25	1481.34	1484.45	0.004409	13.98	3868.94	777.54	0.78
1	8871.451	100 Yr	Hunter Rd rev ex	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8871.451	100 Yr	Hunter Prop Raise Rd	24000.00	1467.83	1476.22	1475.78	1478.18	0.022515	16.90	3609.18	888.97	1.52
1	8240.325	100 Yr	Hunter Rd rev ex	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	8240.325	100 Yr	Hunter Prop Raise Rd	24200.00	1460.89	1472.71	1470.45	1474.46	0.002809	10.83	3048.32	687.81	0.62
1	7746.589	100 Yr	Hunter Rd rev ex	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7746.589	100 Yr	Hunter Prop Raise Rd	24200.00	1455.74	1468.65	1467.02	1472.53	0.004391	16.05	1887.61	255.76	0.81
1	7095.764	100 Yr	Hunter Rd rev ex	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	7095.764	100 Yr	Hunter Prop Raise Rd	24200.00	1453.38	1467.88	1464.58	1469.98	0.002343	12.31	2984.40	300.80	0.60
1	6615.735	100 Yr	Hunter Rd rev ex	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6615.735	100 Yr	Hunter Prop Raise Rd	24200.00	1449.72	1463.31	1463.31	1468.06	0.005544	19.30	2428.94	287.92	0.93
1	6072.811	100 Yr	Hunter Rd rev ex	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	6072.811	100 Yr	Hunter Prop Raise Rd	24200.00	1449.20	1458.64	1458.49	1462.30	0.006708	15.64	1853.20	269.22	0.95
1	5545.166	100 Yr	Hunter Rd rev ex	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5545.166	100 Yr	Hunter Prop Raise Rd	24200.00	1444.10	1454.87	1454.87	1458.43	0.007956	15.15	1637.22	242.00	1.00
1	5139.7	100 Yr	Hunter Rd rev ex	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	5139.7	100 Yr	Hunter Prop Raise Rd	24200.00	1438.89	1455.54	1450.28	1456.58	0.001154	8.21	3155.61	287.75	0.42
1	4667.436	100 Yr	Hunter Rd rev ex	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4667.436	100 Yr	Hunter Prop Raise Rd	24200.00	1432.82	1453.11	1449.64	1455.67	0.002346	13.31	2737.59	333.22	0.60
1	4475.51	100 Yr	Hunter Rd rev ex	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4475.51	100 Yr	Hunter Prop Raise Rd	24200.00	1430.38	1449.02	1449.02	1454.69	0.005597	19.93	1915.85	264.79	0.91
1	4282.712	100 Yr	Hunter Rd rev ex	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46

HEC-RAS River: EB\_NS Reach: 1 Profile: 100 Yr (Continued)

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
1	4282.712	100 Yr	Hunter Prop Raise Rd	24200.00	1427.88	1450.72	1444.58	1452.29	0.001337	10.13	2642.63	203.91	0.46
1	4102.991	100 Yr	Hunter Rd rev ex	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	4102.991	100 Yr	Hunter Prop Raise Rd	24200.00	1425.57	1445.49	1445.49	1451.39	0.007011	19.58	1328.30	127.46	0.98
1	3949.696	100 Yr	Hunter Rd rev ex	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3949.696	100 Yr	Hunter Prop Raise Rd	24200.00	1426.78	1444.61	1443.35	1449.29	0.005114	17.37	1432.39	132.98	0.85
1	3749.133	100 Yr	Hunter Rd rev ex	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3749.133	100 Yr	Hunter Prop Raise Rd	24200.00	1428.02	1444.63	1442.75	1447.97	0.004107	14.71	1716.74	161.07	0.76
1	3601.239	100 Yr	Hunter Rd rev ex	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3601.239	100 Yr	Hunter Prop Raise Rd	24200.00	1429.02	1444.90	1442.04	1447.11	0.002987	11.97	2115.45	262.00	0.63
1	3340.424	100 Yr	Hunter Rd rev ex	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	3340.424	100 Yr	Hunter Prop Raise Rd	24200.00	1430.85	1444.69	1441.62	1446.23	0.002311	9.99	2592.98	355.16	0.56
1	2882.748 3039	100 Yr	Hunter Rd rev ex	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2882.748 3039	100 Yr	Hunter Prop Raise Rd	24200.00	1433.99	1441.76	1441.57	1444.40	0.007159	13.09	1983.20	423.33	0.93
1	2502.781	100 Yr	Hunter Rd rev ex	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66
1	2502.781	100 Yr	Hunter Prop Raise Rd	24200.00	1432.90	1440.65	1438.89	1442.24	0.003500	10.13	2519.07	506.53	0.66

## **APPENDIX C**

### **Sediment Transport Results**

Table 1. Results of sediment transport analysis at select locations; East Branch Neversink River.

STREAM	STATION	LOCATION	COMPETENCE	CAPACITY
East Branch	103+00 <i>*Reference</i>	DS of 'Old Bailey Place'	Stable	Stable
East Branch	12+00	Church Hall	Aggrading	Aggrading
East Branch	20+00	Wellington	Aggrading	Aggrading
East Branch	55+00	Blue Hill Café	Aggrading	Aggrading
East Branch	81+00	Fire Hall	Degrading	Stable
East Branch	98+00	US Double Bridge	Aggrading	Aggrading
East Branch	109+00 LEFT	Left channel 'Old Bailey Place'	Degrading	Stable
East Branch	109+00 RIGHT	Right channel 'Old Bailey Place'	Aggrading	Aggrading
East Branch	127+00	US of 'Old Bailey Place'	Degrading	Aggrading
East Branch	129+00	DS of USGS Gage	Stable	Stable
East Branch	147+50	DS of Upper Island	Aggrading	Aggrading
East Branch	153+00 LEFT	Upper Island	Aggrading	Aggrading
East Branch	153+00 RIGHT	Upper Island	Aggrading	Aggrading
East Branch	158+00	Upper project reach	Aggrading	Aggrading
East Branch	166+00	Upper project reach	Aggrading	Aggrading

*Table 2. Results of sediment transport analysis at select locations; Neversink River main stem.*

STREAM	STATION	LOCATION	COMPETENCE	CAPACITY
Neversink	189+00 US	US Hunter Rd. Bridge	Aggrading	Aggrading
Neversink	189+00 DS	DS Hunter Rd. Bridge	Aggrading	Stable
Neversink	229+00 Left	Lower "Forever Wild"	Aggrading	Aggrading
Neversink	229+00 Right	Lower "Forever Wild"	Stable	Stable
Neversink	243+50	Middle "Forever Wild"	Aggrading	Aggrading
Neversink	280+00	Lower end Tannery Flats	Degrading	Degrading



**APPENDIX D**

**General Stream Management Recommendations**

## **Stream Management Program Recommendations**

The LFA process highlighted many of the general recommendations adopted by Denning and Neversink in their Rondout and Neversink Stream Management Plans. These sections are included here because they describe comprehensive solutions that serve both the Towns of Denning and Neversink and the target audiences of the Rondout and Neversink watersheds.

### **Flood Protection**

The impact of floods on private property, public infrastructure and the quality of life have historically been a primary concern of many watershed stakeholders and continues today, as indicated by the Streamside Landowner Survey (Gilmour 2009). Though the valley is highly prone to flood events due to its local climate, topography and geology, stakeholders can work proactively to reduce or prevent some of their impacts. Flood-related damages and recovery expenses strain local resources and disrupt the fragile economy of the community. The recommendations in the following section represent on-going projects and proposed initiatives which could be implemented to reduce flood impacts.

### **Selective Stream Gravel Management**

***Recommended:*** that an independent stream scientist is funded to create a guidance document with recommendation on how, when and where to scientifically manage problematic gravel deposits with the Rondout Creek watershed.

***Notes:*** Numerous concerns have been expressed regarding current policies and regulations restricting gravel removal. It is the Stream Management Program's role to investigate these issues by advancing discussion with the appropriate regulatory agencies.

### **Debris Management**

***Recommended:*** that a protocol be developed for the inventory of floodplain debris and assistance to municipalities and communities in debris management.

***Notes:*** Develop protocol to ensure responsible floodplain management, including annual clean-up efforts, prevention of illegal dumping, and flood event debris management. The Program Team may need to explore issues of landowner liability for managing large woody debris. Removal of large woody debris would focus on areas that pose a flood hazard to

infrastructure and a threat to human welfare.

### **Post-Flood Technical Assistance**

**Recommended:** to work cooperatively on improving immediate post-flood emergency intervention capabilities through demonstration and training with contractors and local municipalities in scientifically-based stream principles, procedures and methods.

**Notes** In many areas post-flood work unravels stream systems more than any other non-flood work combined. Using Delaware County SWCD's contractor training workshop as a model, provide local contractors and highway superintendents with training on regional hydraulic relationship curves, natural stream restoration principles and techniques, and identifying best management post-flood intervention techniques.

### **Highway Activities and Infrastructure for Water Quality Improvement**

**Recommended:** that the Town and County Highway Departments and NYSDOT integrate geomorphology principles in all new projects and routine maintenance activities related to the Rondout Creek stream system.

**Notes:** Road/drainage infrastructure improvements are of particular interest to respondents of the Streamside Landowner Survey (Gilmour 2009). Activities related to maintenance of highway infrastructure accounts for the vast majority of stream management activities. Highway activities including maintenance, new construction and flood response, can greatly benefit from consideration of stream process. One possible area for collaboration is the creation of a protocol to evaluate existing culverts and bridges following geomorphic principles, and working together to prioritize and design culverts for retrofitting and replacement where necessary.

### **Stream Stability Restoration**

**Recommended:** Secure funding commitments for additional unfunded restoration projects on the Rondout Creek as discussed in individual management segments.

**Notes:** In this Plan, the Project Team identified a number of reaches which are strongly recommended for restoration. Additional restoration sites should be prioritized, ranked and continuing funding sought.

### **Historic & Current Condition Analysis & Documentation**

**Recommended:** that historical records for precipitation metrics be analyzed so current trends in precipitation amount, intensity, timing of snowmelt and other forces potentially affecting flood frequency and stream flow response can be shared with planners seeking to mitigate their effects.

### **Flood Response Technical Resources**

**Recommended:** that trained professionals be identified to provide onsite guidance for stream modifications immediately following flooding. Guidelines that integrate stream form and function should be developed for use during post flood response.

**Notes:** The existing approach to flood management of patching flood damage without stream process knowledge wastes limited funding, may leave localities more vulnerable to future floods and may create liability for already devastated communities. Guidelines for work on flood damaged with minimal stream disturbance would greatly reduce risk of further instability. Stream professionals from Sullivan County Soil & Water Conservation District can provide for rapid and coordinated expert review and guidance on a regional basis during planning, funding, permitting and construction phases of flood remediation.

### **Flood Damage Prevention Library**

**Recommended:** that the Program Team develop a “one stop shop” for public distribution of National Flood Insurance Program publications; and that an annual notice be published in local newspapers providing notification about the availability of this flood damage prevention library.

**Notes:** FEMA, the National Association of Floodplain Managers and others have developed extensive materials to assist watershed stakeholders in making sound development decisions related to flooding and flood damage prevention.

### **Flood Ordinance Review**

**Recommended:** that the Towns of Denning and Neversink conduct a review of current floodplain ordinances and consider adopting revisions that integrate broader community plans, reflect current building codes. It is also recommended that the Towns of Denning and Neversink acquire and utilize geographic information system (GIS) software to assist with floodplain mapping.

*Notes:* The Sullivan and Ulster County Soil and Water Conservation Districts can provide technical and administrative support to the review process in consultation with NYSDEC and the Sullivan and Ulster County Planning departments respectively.

### **Community Rating System**

**Recommended:** that the Towns of Denning and Neversink consider participation in the FEMA Community Rating System.

*Notes:* Municipalities may be able to reduce flood insurance premium rates under the Community Rating System. The Municipalities are strongly encouraged to adopt a “No Rise/Good Neighbor” clause in their revised floodplain ordinance. A “No Rise/Good Neighbor” clause would enable townships to develop codes which would prevent new construction from causing a rise in floodwaters.

### **Notification**

**Recommended:** that the Towns of Neversink and Denning facilitate periodic notification to landowners who have special flood hazard areas (SFHA) located on their property.

*Notes:* Recent digitization of the real property tax parcels in the NYC watershed, and the development of digital flood maps by NYSDEC can be integrated into a database which would allow for notification of landowners regarding the presence of SFHA on or near their property or business. The database can be used to develop a mailing list of properties with a SFHA present, and periodically a direct mailing can be made to each property owner.

### **Flood Hazard Education Sessions**

**Recommended:** that the Towns of Denning and Neversink, working with local and state agencies, support periodic training sessions on flood related issues; and that the audience include municipal leaders, code enforcement staff, planning boards, landowners, realtors, lending institutions and others.

*Notes:* Knowing how to properly manage floodplains is crucial to continued safety and economic sustainability. NYSDEC and the New York State Department of State (NYS DOS) have established education programs geared to local municipalities. Better understanding of flood damage potential, stormwater implications, the NFIP, and use of Federal Insurance Rate Maps will empower local officials to make informed decisions.

### **Flood Damage Database**

*Recommended:* that the Towns of Denning and Neversink facilitate development of a flood damage reporting system to track types of flooding, their location and the costs associated with flood damage.

*Notes:* Initially, a database would collect overall records on past floods; then localized flooding occurrences and damages could be documented. Areas with repetitive damage can be prioritized for mitigation because this cumulative cost damage data provides justification for mitigation grant program funding. Training and administrative support would ensure success.