Subject	**DR4355NH - Bartlett - Meeting Follow up**
From	Hughes, Max <max.hughes@fema.dhs.gov>
To	bob181 (bob181@roadrunner.com) <bob181@roadrunner.com>, chief.keaton (chief.keaton@townofbartlettnh.org) <chief.keaton@townofbartlettnh.org>, fire.chief (fire.chief@townofbartlettnh.org) <fire.chief@townofbartlettnh.org>, heidi.lawton (heidi.lawton@dos.nh.gov) <heidi.lawton@dos.nh.gov>, selectmen (selectmen@townofbartlettnh.org) <selectmen@townofbartlettnh.org>, Travis Chick (roadagent@townofbartlettnh.org) <roadagent@townofbartlettnh.org>
Cc	Chris Fournier <cfournier@hebengineers.com>
Date	2018-08-20 07:34

- Bartlett,town of - WO 18298 - DI 116730 -FIRMETTE.pdf (~415 KB)
- HM Report WO 18135-18298 Town of Bartlett 05042018.pdf (~4.2 MB)

Good Afternoon,

Here is the flood map and Dr. Downer's Report as promised. Have a good weekend.

Regards,

Max Hughes
Public Assistance
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Manchester, NH 03104
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FEMA

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainag areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/5/2018 at 8:59:37 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Mitigation Site Visit Bartlett, NH

WO's 18135 & 18298

May 4, 2018

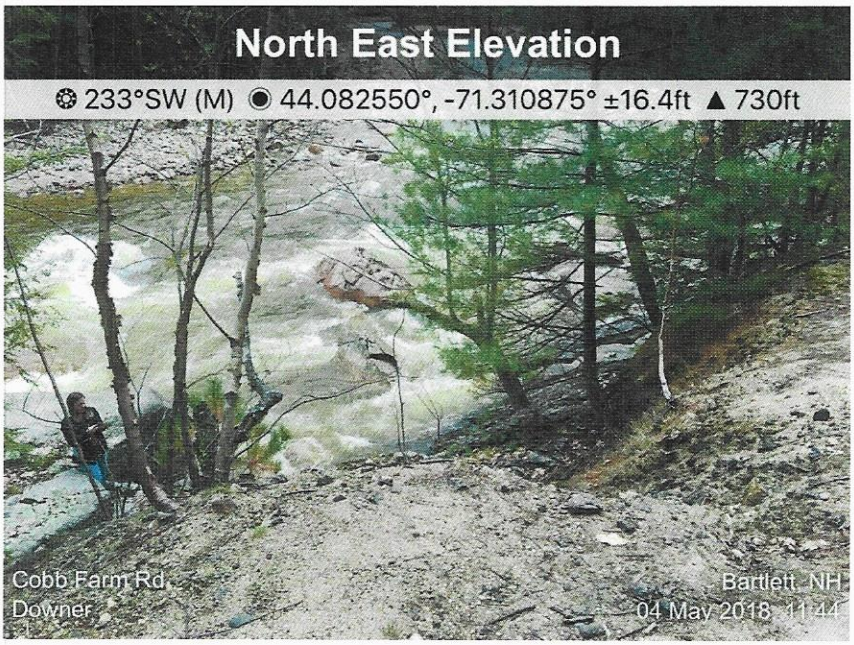
Accompany: Heather McMasters, FEMA Site Inspector
John Coleman, FEMA Site Inspector
Jonnie Lee, U.S.ACE
Travis Chick, Bartlett Road Agent

Following a group meeting at the Glen, NH Fire House, the Site Inspectors and Town Road Agent toured three sites: Cobb Farm Road, River Street Bridge and Sleepy Hollow Road.

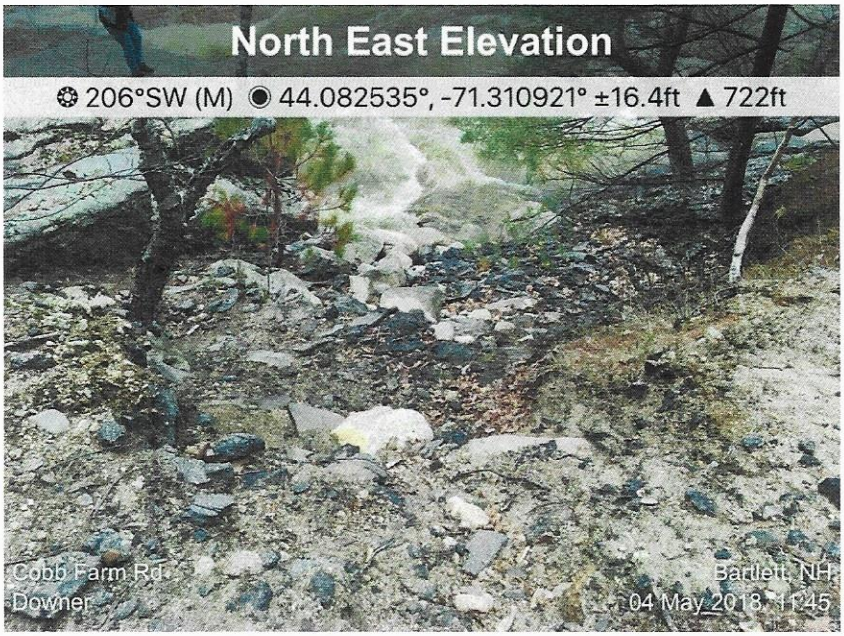
Cobb Farm Road
DI #116729
The Applicant claims a 700 foot section of Cobb Farm Road adjacent to the Soco River was made unstable by the declared event and that a very large boulder fell from the road embankment allowing the river to erode a section of the bank.

Standing on the road edge, one gets a view of what appears to be slope failure.

The adjacent photo shows the apparent gully and large boulder.

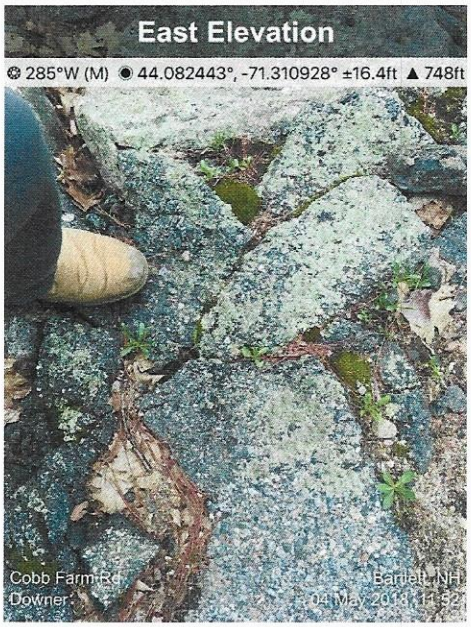


A closer view shows that the apparent gulley is covered with broken asphalt.

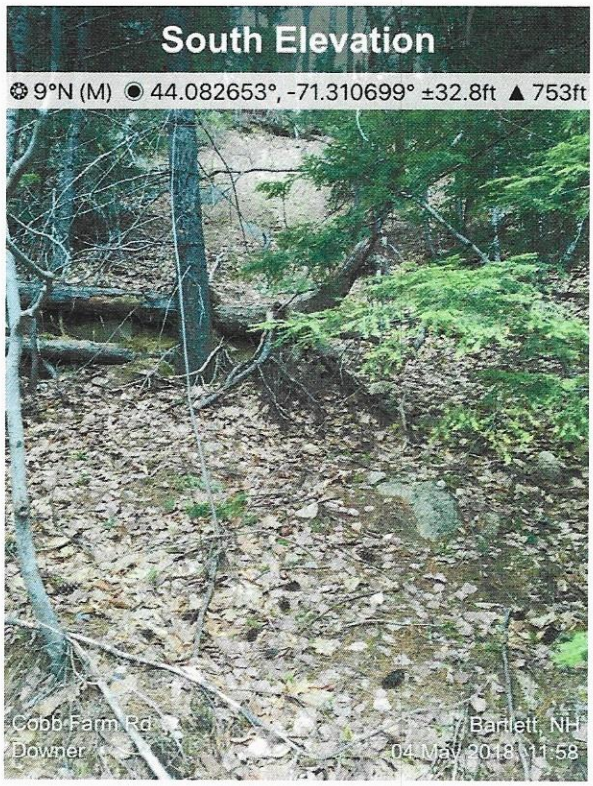


At some earlier time the Applicant tried to stabilize the gully by dumping asphalt chunks over the bank.

The asphalt chunks were place a long time ago, as they are covered with lichens.



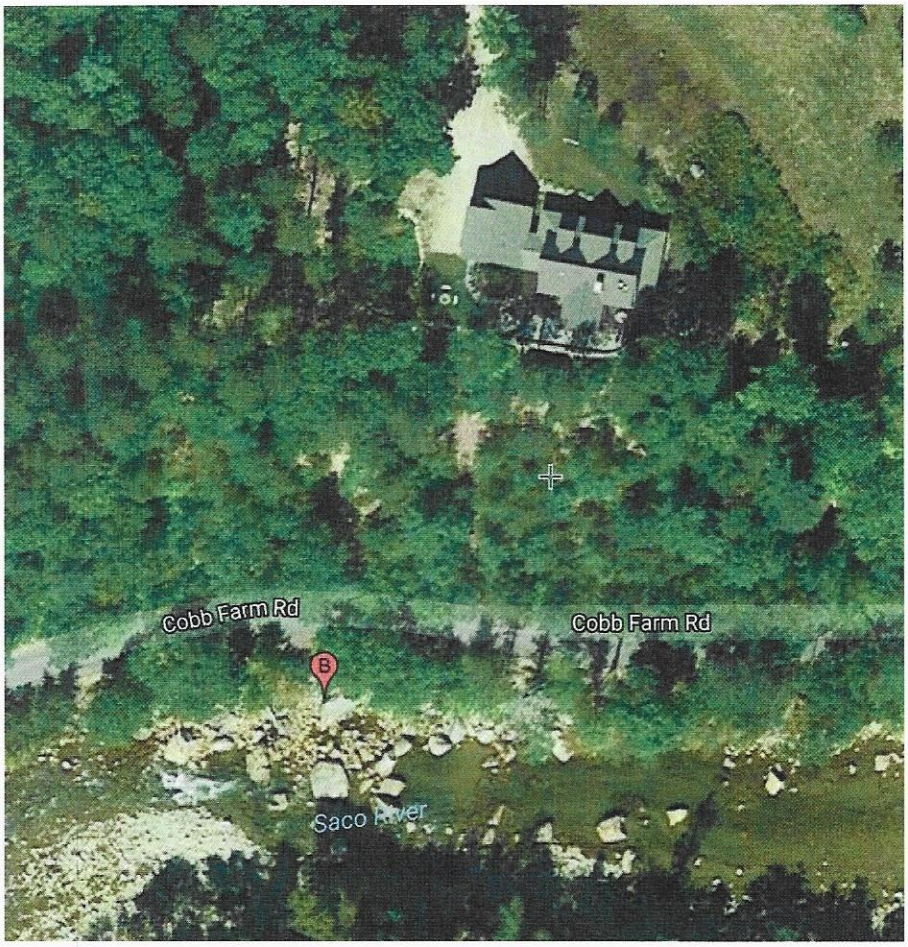
The river bank in this area has been unstable for many years. The bent tree trunks are witnesses to the slow downward movement of the slope.



Further investigation revealed a gully immediately uphill of the river-bank gulley (to the south). There is a 10-foot un-vegetated escarpment at the top of the slope and evidence that water frequently flows down the slope and across the road toward the river bank gully.

Aerial photos from ACME Mapper suggest that the source of the excess water running down the slope is the grounds surrounding a large house at the top of the bluff.

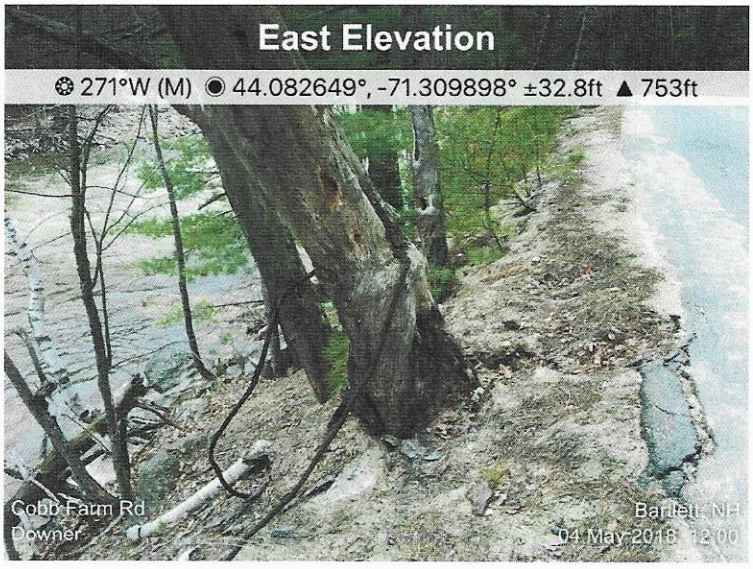
The un-vegetated scarp is clearly visible mid-way down the slope.



Over the years, the Town has slowly widened Cobb Farm Road; now a 20-foot wide pavement. The roadway was once protected by guard posts with cables. The cables can be seen embedded in trees and partially buried along the edge of the road shoulder.

Over the 700 feet of roadside slope there is ample evidence in the form of leaning trees and bent tree trunks, that that the slope is unstable.

The toe of the slope at the river's edge is exposed rock, but there was little evidence of bank erosion at the toe.



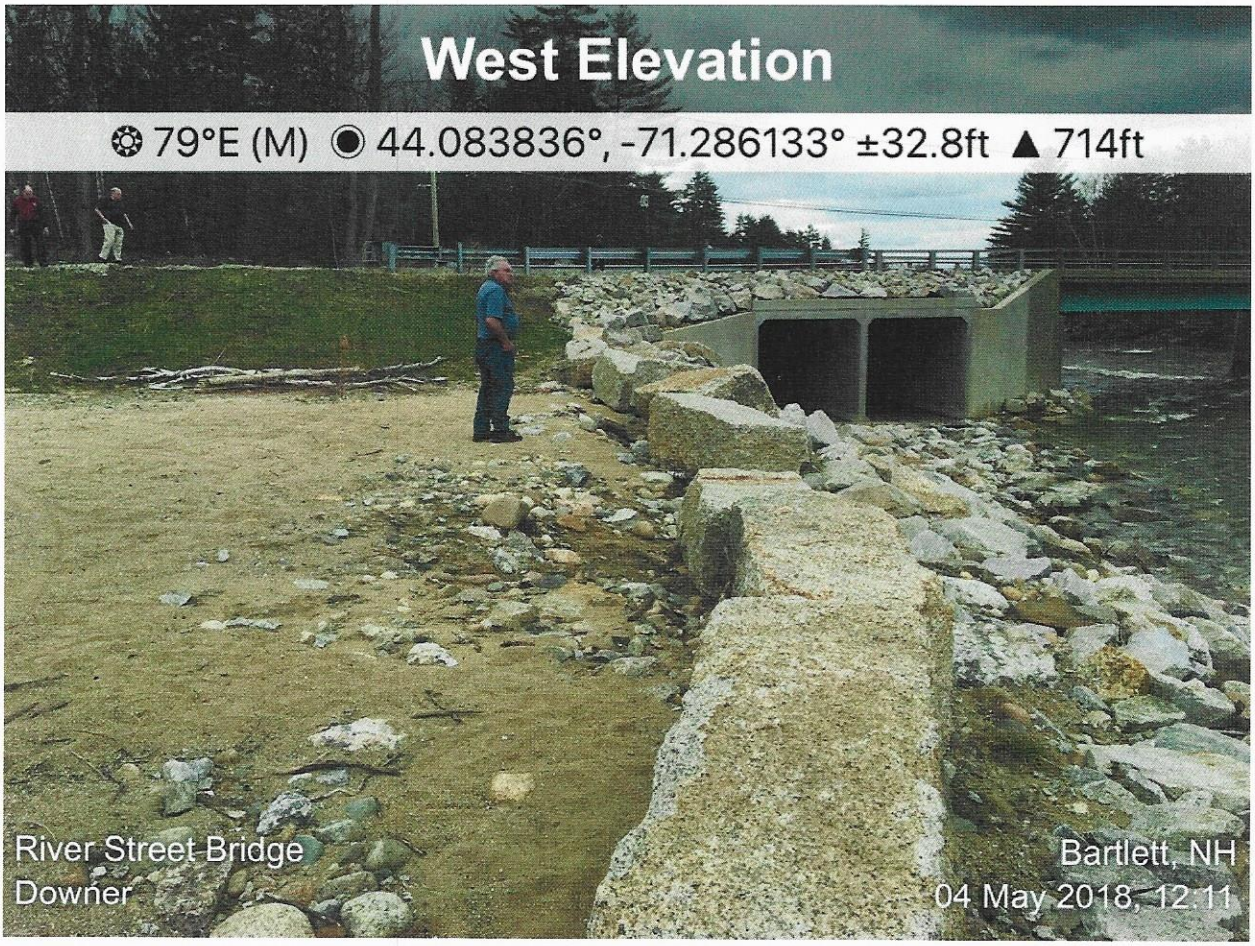
Suggested Mitigation

None.

River Street Bridge DI #116730

During the declared event, flood waters rose to near the level of the road surface, but did not flow over the road. At its highest flood level an eddy formed above the box culvert. This eddy swept the riprap away and caused a section of the bridge approach asphalt pavement to collapse.

Repairs were 100% complete on this date, May 4, 2018.



Mitigation

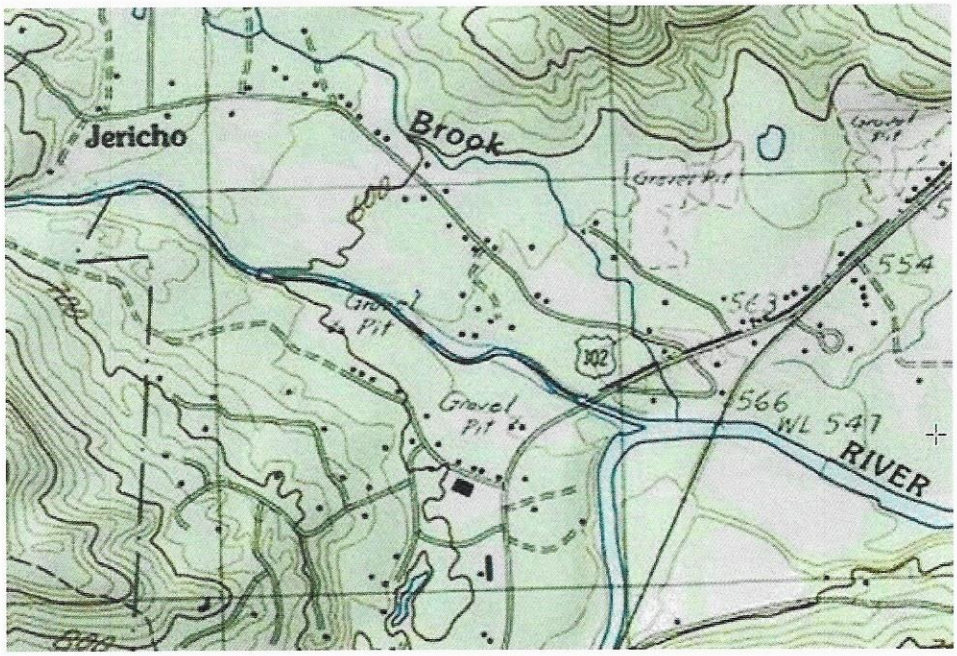
As mitigation, the Road Agent suggested that he would like to extend the concrete wing wall by ten feet northwest. And, to riprap the, now grassed, road embankment for a distance of about an additional 40 feet. The intent being to armor the bridge approach should the flood waters again raise above the parking lot in the foreground.

The final plans for mitigation will be dependent of the Cost to Repair to Pre-disaster Condition.

Breached Berms DI #116333

The photo below shows one of several breached berms. This one is just upstream of the River Street Bridge. The berms were constructed on both sides of the river sometime in the 1950's. The berms are all on private lands. At this time, it is not clear who authorized their construction, who paid for the work or who was responsible for their maintenance.

Sleepy Hollow Road
DI #116728



Jericho Road becomes Sleepy Hollow Road on the south side of NH Route 302 and Sleepy Hollow Road becomes Old Route 302 as it loops back to Route 302.

During the declared event, Mountain Brook jumped its banks and ran down the north side of Jericho Road before crossing Route 302 and then flowing down Sleepy Hollow Road toward the Soco River.

Both properties on either side of Jericho Road, at the Route 302 intersection, received flood damage. The east property sit up high, while the west property sits in a low spot. The house was flooded. Only gravel was lost on Sleepy Hollow Road.

Mitigation
None.

Town of Bartlett
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603-356-2950
selectmen@townofbartlettnh.org

August 22, 2018

To: Perry Plummer (Director- Homeland Security), Heidi Lawton (Senior Field Representative-Homeland Security), Fallon Reed (Planning Chief-Homeland Security), Max Hughes (Program Manager – FEMA), Chuck Henderson (Special Assistant-Senator Jeanne Shaheen)

In reviewing Dr. Downers report the Saco River berms and Rocky Branch berms are not even mentioned nor are cobble removal from these areas. The berms up near the dugway are not mentioned.

Cobb Farm DI 116729

While there may be some water coming from the road the majority of the damage to the bank came from the October storm undermining the bank. This is caused in part by the gravel bank upstream and opposite the site, forcing the river up against the bank. The Town road needs to be protected as it is a dead end and the only access. Surely the road might be a bit wider now than 100 years ago but there has been no widening in recent memory. There is not any room to widen.

River Street Bridge DI 116730

Unless the cost of replacing the bridge or major damage to it is part of the mitigation costs we are at a standstill at the moment.

Breached Berms DI 116333

While the berms may be on private land the Federal Government through the Army Corp of Engineers and FEMA have on at least three occasions been involved in paying for work on these berms. Clearly there should be no confusion as to who paid for the work; Federal Government, State of NH and Town of Bartlett or who authorized the work.

Sleepy Hollow Road DI 116728

While Mt. Brook may have (not sure) jumped its banks the major impact of the damage was done by the Rocky Branch River. To the stated position that only gravel was lost on Sleepy Hollow Road, the Town just paid for the paving of that road as a result of the storm and in fact are submitting the bill to FEMA as it has been approved as a project.

How one could think that Mt. Brook caused all the damage or there was only a gravel loss on Sleepy Hollow defies logic. Further issue which isn't even mentioned is the washout and closure of Route 302. This was not the result of Mt. Brook, it was the result of the Rocky Branch River. Unless gravel bars are removed and the berm repaired and lengthened not only will Route 302 be washed out again there is a very real potential for the Rocky Branch Bridge on Route 302 will suffer significant damage or washout. This area has received federal money in the past. In addition to the house mentioned in the report four or five other houses were flooded along Route 302.

This may have been a limited site visit by Mr. Downer but the report contains some glaring omissions and errors which cannot stand without being corrected. Why all the other areas of concern are not addressed is confusing and why the only report centers on these few sites.

Unfortunately it is becoming readily apparent that instead of trying to help protect the infrastructure in Bartlett, ways are being developed to make sure no help will be forthcoming. Every location seems to have roadblocks thrown up and if one is addressed another follows.

We were under the assumption that FEMA was to help not hinder.

The folks at NH Homeland Security have been very helpful but they too seem stonewalled.

Hopefully we can move past all of this and get some help for our community.

Board of Selectmen

Chairman Gene Chandler

David Patch

Vicki Garland

The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

August 20, 2018

To: Gene Chandler, Selectman, Town of Bartlett
David Patch, Selectman, Town of Bartlett
Vicki Garland, Selectman, Town of Bartlett

From: Shane Csiki, Ph.D, CFM, Flood Hazards Program Administrator, New Hampshire Geological Survey

Cc: Rick Chormann (State Geologist, NHGS), Rene Pelletier (Water Division, NHDES), Jennifer Harper (Director, NH HSEM), Fallon Reed (NH HSEM), Heidi Lawton (NH HSEM), David Vaillancourt (NH HSEM); Mike Servetas (NHDOT); Tracie Sales (NHDES)

Re: Saco River site visit summary from August 15, 2018

On August 15, 2018, personnel from the New Hampshire Geological Survey (NHGS), NHDES, NH HSEM and NHDOT performed a site visit to the Saco River at Bartlett. The focus of this technical summary regards a site about 1,400 feet downstream of the River Street bridge, on river left (relative to facing downstream), hereinafter termed the "Yates Farm site." As with other summaries, this will focus on: (1) current river processes and site situation as understood by this evaluator; (2) the long-term technical consequences based on these processes; and (3) potential mitigation options that could be compatible with the site situation and operating processes.

Additionally, on this site visit, many residents who attended commented extensively on how the Saco River has changed, particularly since Tropical Storm Irene. Thus, this summary also provides brief comments on Tropical Storm Irene and its long-term aftermath from a technical perspective, that hopefully, town officials and residents may find valuable in the conversation about the Saco River.

Yates Farm site

The Saco River in front of this site is actively undergoing extensive bank erosion, with complete exposure of all composite bank material. Given its small cobble and loose sand composition, it will be highly erodible during flows that reach a height that flows against the material. The landowner expressed that this erosion has occurred at and since the October 2017 flood event.

Figure 1 shows an overview of the Saco River from the River Street bridge to the Yates Farm site on aerial imagery from 2015. Note the existence of bank erosion on river left upstream of the yellow circle (Yates Farm site). However, a closeup of the Yates Farm site on the same aerial imagery (Figure 2) shows that no, or limited, bank erosion was occurring in the 2015 aerial imagery. Lower-resolution 2016 aerial imagery, taken at leaf-out (Figure 3) shows considerable tree canopy during the summer. However, there are signs, based on an indentation in the channel morphology (violet circle; Figure 3) that flow had begun to cut into the bank in this image.

out:blank

8/27/20

Figure 1. Overview of Saco River in vicinity of River Street bridge crossing. Yellow circle demarcates the Yates Farm site.

Figure 2. Close-up view of the Yates Farm site in 2015 aerial imagery. Note tree canopy along the bank in front of the lawn of the property. Also note that the integrity of the bank at this location appears intact. Note the bank erosion directly upstream, however.

Figure 3. Lower-resolution aerial imagery from Summer 2016. Note the tree canopy in front of the lawn of this property. Note the indentation in channel morphology in front of the bank (violet circle).

Aerial imagery (low- or high-resolution) is unavailable since 2016. However, the current site condition, on the site visit can be seen in Figures 4 and 5.

Figure 4. View taken within the eroded bank area near the center of the violet circle in Figure 3. Note the break in tree canopy along the bank as compared to that shown in Figure 3.

Figure 5. View of the eroded bank looking up at the top of the current bank. This photo was taken from within the area of the violet circle in Figure 3. Note the lack of tree canopy, as compared to the continuous canopy shown in Figure 3.

Although aerial imagery does not exist since 2016, the 2015 aerial imagery was used to in order to estimate, within ArcGIS, the lateral extent of bank erosion based on the current bankline position relative to the shed at the east end of the eroded area, as observed on August 15, 2018. The result is approximately 25 feet of lateral (landward) erosion.

In considering the planform of the Saco River, this site is at the point at the downstream end of the outside of a meander bend where bank erosion will be maximized. The bend in question is the large bend on the Saco River that includes the River Street bridge crossing. Bank erosion is present on the river upstream of the Yates Farm site, and on the same side of the river, which is present in the 2015 aerial imagery. Given that the composition of these banks is identical to that at Yates Farm, it was likely only a matter of time before erosion initiated at Yates Farm, based solely on position relative to the meander planform alone. The erosion of rivers is maximized on the outsides of river meander bends.

It is a known fact that the River Street bridge and approaches are serving to constrict the Saco River and attendant sediment transport processes at that point, including sediment deposition upstream. This has been covered in previous summaries. In rivers, when sediment becomes trapped upstream of a constriction, the river downstream will be "hungry" for sediment – which means that a river will seek to erode sediment from elsewhere, such as the bed or banks, in order to re-attain a sediment load that is in balance with its sediment transport carrying capacity. Thus, erosion is typically seen on rivers and streams downstream of constrictions. As seen in Figure 6, the Saco River bed in front of the Yates Farm site is relatively uniform across the channel. This is likely exacerbating bank erosion by forcing flows laterally into the outside of the meander bend.

Figure 6. View of Saco River bed in front of Yates Farm site. Note the low-flow shallow and uniform depth across the channel.

Beyond the basic river process understanding presented here, answering of the question as to the precise flow dynamics that are leading to erosion on this reach of river would require detailed and extensive tests to understand the three-dimensional flow structure and turbulent motions of flow and their connections to sediment transport processes. This would require use of an Acoustic Doppler Current Profiler, with attendant cross-section setup, and would be extremely costly.

Given the existing situation at the Yates Farm site, the loose bank material is completely exposed to the flows of the Saco River. There are cobbles that have been plastered at the base of the bank which will act to protect the base (Figure 5), however, higher flows will continue to erode this bank and cause it to fail. The rate of further bank erosion cannot be precisely predicted. The downstream extent of the eroded area is located adjacent to the corner of the shed at the east end of the site. Given the erosion occurring just upstream, the progression of further bank erosion in the downstream direction is very plausible.

If bank stabilization is an option to be considered in the future at this location, an engineer will need to be retained to calculate a design that will ensure large angular stone is of sufficient size to resist the shear stresses directed into the bank at higher flows. The base of the bank would also likely need to be reconfigured in order to allow the stone protection to be keyed into the bed to maximize future integrity. A design engineer that examines this situation should also be asked to contemplate whether a bioengineered solution could work here. Yet, the engineer would also need to calculate whether a bioengineered solution could survive the shear stresses directed into the bank at this location, and if the bank angle has too great a vertical component to allow such a solution.

Tropical Storm Irene and ongoing North Country river concerns

At the site visit, discussion ensued regarding town official and resident observations that the Saco River has changed and is not behaving in the same way now, after Tropical Storm Irene (August 28, 2011), as compared to the years before Irene. The direct end result of Tropical Storm Irene was two-fold: (1) miles of riverbank that had previously been of good integrity became extensively eroded in a manner similar to the Yates Farm site; and (2) lengths of previously straightened rivers that had maintained their imposed form for many years experienced further deterioration as a result of induced bed and bank erosion. These processes occurred on rivers throughout the North Country, for which residents, town officials and the state have been working to address ever since.

A study by Yellen and others (2016) of the sediment records adjacent to rivers in the northeastern United States showed that Irene led to the greatest amount of erosion and mass failures as compared to any flood in the historic record. While Tropical Storm Irene was not remarkable in either precipitation intensity or amounts on its own, the storm was preceded by high amounts of precipitation in the month prior, which contributed (via saturation of streambanks, and subsequent weakening) to the extent of the effects seen on rivers. Because of the resultant exposure of underlying highly erodible sand, gravel and cobble within streambanks, and the deterioration of many berms that initiated at the time, many locations on New Hampshire rivers, particularly in the North Country, are continually at risk for further erosion and subsequent risks today.

References

Yellen, B., Woodruff, J.D., Cook, T.L., Newton, R.M. 2016. Historically unprecedented erosion from Tropical Storm Irene due to high antecedent precipitation. *Earth Surface Processes and Landforms,* 41(5):677-684.