

**TO:** Federal Energy Regulatory Commission  
Office of Energy Projects  
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Washington D. C. 20426

By electronic filing

**FROM:** John T. B. Mudge  
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**RE:** **Wilder Project, FERC No. 1892-026**  
**Bellows Falls Project, FERC No. 1855-045**  
**Vernon Hydroelectirc, Project No. 1904-073**

**ILP Study 2 and Study 3 — Riverbank Transect and Riverbank  
Erosion Studies — Study Report released August 1, 2016**

**DATE:** September 25, 2016

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**CONTENTS: Landowner's comments, Study 2/3, (Comment period ends  
September 29, 2016).**

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To the reader:

For further information or to visit the Mudge fields referred to on the  
following pages please contact me at the above address and phone. — *John Mudge*

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## **Introduction**

On January 28, 2013, at a FERC Scoping Meeting held in West Lebanon, New Hampshire, a spokesman for TransCanada, the company that owns the Wilder Dam on the Connecticut River, stated that the company did not “propose” a study on geology and soil resources as a part of the license renewal procedures for that dam. He further stated, that TransCanada employees, on a boat trip of the entire Wilder Dam impoundment, saw no signs of erosion. After that statement was made others attending the meeting, including myself, spoke about the tremendous erosion that we live with and have seen along the river. In the weeks after the meeting state agencies, private organizations, and individuals, including myself, submitted requests to FERC asking that erosion studies be required as part of the relicensing process.

It is now August 2016, and three erosion studies have been completed.

On April 26, 2016, I filed my response to Study #1, the Historical Riverbank Position and Erosion Study that was released on March 1, 2016.

I am now responding to Studies 2 & 3, the Riverbank Transect and Riverbank Erosion Studies that were filed with FERC on August 1, 2016, as a single report.

My family has owned farmland on the Connecticut River since 1962 and since the FERC meeting in January 2013, I have attended a number of meetings where the erosion was discussed, including the Updated Study Results Meeting on August 25, 2016, where Study Report 2/3 was discussed.

I do not agree with many of the findings of Study 2/3, and I also question much of the methodology that was used.

For many of us that own frontage on the Connecticut River, the erosion that we have seen over the years is a tremendous problem that gets worse and worse each year. Some property owners have received financial support from federal agencies to try and control the erosion under different cost sharing programs. From my experience I know that much of the discussion at the meetings of the local advisory committees established by the New Hampshire and Vermont Connecticut River Joint Commission is about erosion on the riverbank.

Erosion on the Connecticut River is a problem that TransCanada first denied existed in January 2013 and now has issued a flawed report where the consultant’s conclusions simply agree with the corporate policy of denial.

Yes, there is erosion along riverbanks. That is clearly known and is described in every Introduction to Geology textbook. Rivers and erosion are nothing new.

However, textbook descriptions of riverbank erosion become a little suspect as soon as a dam is put across a river. Both the impounded river above the dam and the riverine area below are now affected by the operations of a dam. The first dam across the Connecticut River was built at Turners Falls, Massachusetts, in 1800. Today, including the storage dams in Pittsburg, New Hampshire, there are a total of fourteen dams across this river— two are in Massachusetts and the rest are north of there. As is noted in Study 2/3, (page 9), dams on the Connecticut River in Vermont and New Hampshire impound 54% of its length. This is a complex river system with very regulated flows. Nobody should be looking for simple textbook answers to the questions that are now being raised about erosion.

Historically, riparian buffers form naturally over a long period of time along rivers and these protect a riverbank from erosion. Riparian buffers and the Connecticut River are well described in the ten fact sheets published by the Connecticut River Joint Commissions in 1998 (and available today online). I included pictures of the riparian buffer on the Connecticut River, including three pictures of my property, pages 6 & 7 of my response to Study #1 of April 26, 2016. One of those pictures is before 1900 and another appeared in the April 1943 National Geographic. There was a strong and healthy riparian buffer on this section of the Connecticut River prior to the construction of the Wilder Dam and that riparian buffer minimized the erosion. When the Wilder Dam was built all of the trees were cut and the raised water flooded the buffer and destroyed the bushes that had been there. Today the stumps of those trees are visible when the water level is lowered. Pictures of exposed stumps are shown on page 13 & 20 of my study request of February 25, 2013.

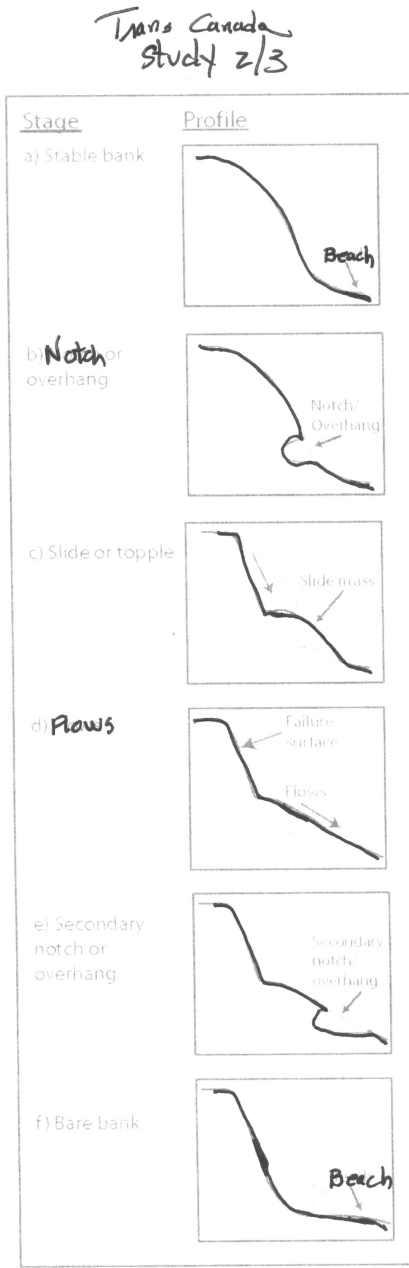
Ever since the completion of the Wilder Dam there has been erosion, and the question now comes up, what is this cycle of erosion?

### **The Cycle of Erosion**

In Study 2/3, Figure 5.6.2-1, page 70, is TransCanada's diagram of the "Cycle of Erosion." The sketches are very interesting, but those sketches should be compared to the sketches that I included in my original Study Request of February 25, 2013. Carefully examine pages 13, 14, 17, 18 & 19 of my Study Request.

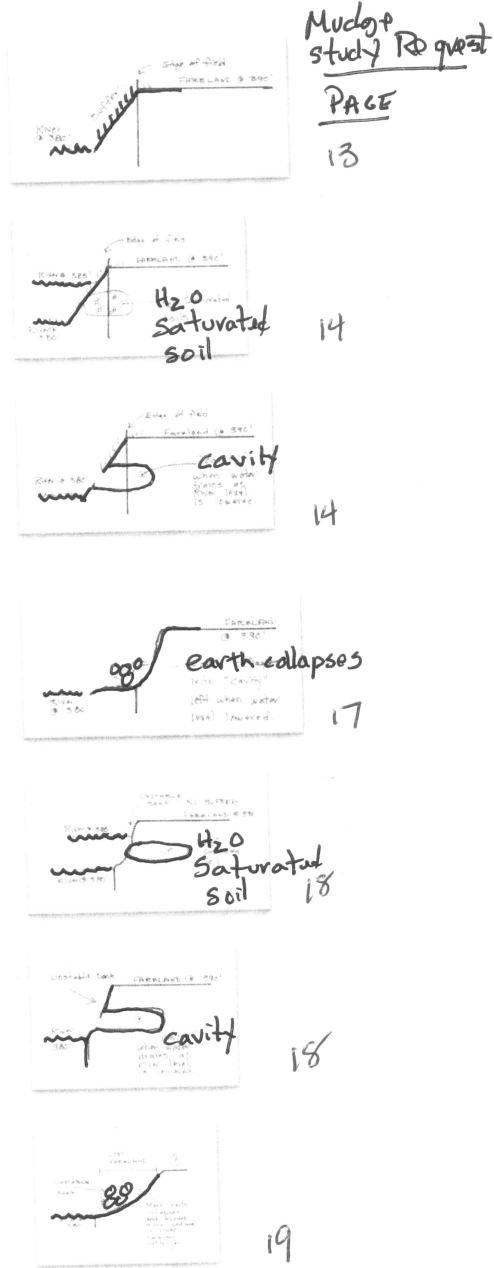
They are basically the same diagrams, but with a very important thing missing from the TransCanada drawings. TransCanada draws a "Stable" bank and I have a sketch with a "Buffer." TransCanada has a "Notch Overhang" and I have a "Cavity." TransCanada has a "Slide Mass" and a "Flow" that I call "Earth collapses." TransCanada writes, "Secondary Notch Overhang" and on page 18 & 19 of my Study Request I again show the "Cavity" and more "Unstable Bank."

What is the difference between these two sets of sketches? It is very simple: *TransCanada does NOT illustrate the river and the fluctuations in the water level. My sketches DO illustrate the fluctuations in the water level!* Below I have reproduced both the TransCanada sketches from Study 2/3, left, and the sketches in my Study Request, right. You can not address the issue of erosion on the Connecticut River without taking into consideration the operations of the dams.



TransCanada study, page 70  
"Cycle of Erosion" August 2016

*Beach = River-level never changed*



Mudge Study Request  
February 25, 2015

*wavy lines = changing river level*

If you exclude the river from your sketches, as it is excluded in the TransCanada sketches, then you must wonder what causes the erosion. In all of its sketches TransCanada leaves the water at the “beach.” *Visit the river and you will see that the water is not at “the beach” at all times.* TransCanada raises and lowers the water in order to generate electricity for the spot market and this sudden raising and lowering of the water has an adverse affect on the saturated and highly permeable soils that are the riverbank. To have excluded the raising and lowering of the river from the “cycle of erosion” diagrams so discredits that discussion as to make it worth less than the time of day.

At different hearings, spokespersons for TransCanada have repeatedly stated that they do not raise and lower the water very much. However, both the Study 2/3 report itself and Appendix A of the report include many pictures of the river when it has been lowered. Similarly, my Study Request of February 25, 2015, includes pictures of the river when the water level has been lowered. Does TransCanada truly believe that it is possible to include pictures of a lowered water level in a study report and then say that it does not lower the water level? *It is an undeniable fact that the impoundment level changes.* I last heard TransCanada assert that the water level is not raised and lowered at the meeting in White River Junction discussing Study 2/3 on the afternoon of July 25, 2016. In fact, on that very afternoon the water level had been lowered and the mud flats were very obvious when driving north on I-91 after the meeting and crossing the Ompompanoosuc River. *The water level goes up and down and something that obvious can not be denied.*

There is a “cycle of erosion” along the riverbank and all factors contributing to it must be included in any and all schematic diagrams of it. TransCanada does not do that.

There is erosion and there is empirical evidence to illustrate it.

In my Study Request of February 25, 2013, I included on pages 7 – 10 information about two surveys that have been done of my property. Copies of the surveys were included in the Study Request as was the below table:

*From the two surveys:*

	1961 LeClair Survey	1989 LeClair Survey
Length of boundary between fields A & B	943.0 feet	918.6 feet
Acreage of Fields B & C	44.0	42.1
River frontage	Fields B & C: 3,080± feet	Fields A, B & C: 4,086± feet– Approximately .77 miles.

What is the current status of that line?

Working for TransCanada, Field Geology surveyed the line between fields A & B in 2015 and their work is described on page 105 of Study 2/3. They were initially not going to put in a new pin when they were doing their work, but I suggested that a new pin should be put in and “a newly installed rebar” is now there. Field Geology writes, “an additional 8 ft of erosion has occurred since 1989.” For that to be true, the line would measure 910.6 feet. There is no indication that the measurement was made by a licensed surveyor. I then had a licensed surveyor in New Hampshire measure the line, and it is 903.1 feet. The three surveys of the same line by licensed New Hampshire surveyors are summarized below.

Survey	Length of line
July 10, 1961 K. A Leclair	943.0
April, 19, 1989, K. A Leclair	918.6
December 8, 2015, H. J. Burgess	903.1

A copy of the letter from Burgess, the 2015 surveyor, is on the next page.

Therefore, there has been 15 feet of additional erosion since 1989, .58 feet per year, *nearly twice* the 0.3 ft/yr stated on page 105 of Study 2/3. This means that there has been 40 feet of erosion since 1961, .74 ft/yr year. Study 2/3 seems to accept this and all erosion as acceptable when it writes that this is an “erosion rate of less than 1.0 ft/yr” (page 105).

Where is it stated by anybody that erosion of 1.0 ft/yr is acceptable? There was a stable bank and a healthy riparian buffer before the construction of the Wilder Dam and the subsequent destruction of that centuries old riparian buffer.

Study 1, Appendix A, Plate A-5, identifies this same land, my fields, as being on the border between “Still Stable” and “Destabilized.” Surveys document that it has been eroding since 1961. When forty feet of land erodes, it is neither “destabilized” nor “still stable.” It is eroding. If the entire .75 miles of frontage has eroded 40 ft., that means 3.75 acres of farmland that has been destroyed by erosion.

There is a cycle of erosion and it was illustrated in the sketches that I included in my original Study Request. As a result of this erosion, landowners throughout the valley have lost land and towns have incurred large expenses repairing roads near the river. It is just plain deceitful and dishonest to schematically describe a “cycle of erosion” that ignores the fluctuations in the level of the water. That is the Connecticut River today— a river controlled by many dams where the riverbanks are of highly permeable soil and the fluctuations in the water level cause tremendous damage to private and public property.

In its Assessment of Project Effects, Study 2/3 reads, page 110: “Absent other changes, however, the banks will eventually re-stabilize when an equilibrium

condition is reached with the new impoundment level.” That might be true if there was a “new impoundment level,” but for more than sixty (60!) years the “impoundment level” has changed frequently, sometimes daily, and that causes the ongoing “cycle of erosion.” *There is no “new impoundment level.”*

Harry J. Burgess

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Date: March 15, 2016

John Mudge  
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Dear John,

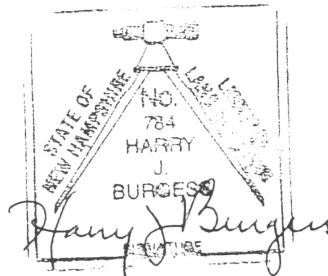
At your request, we measured a line between fields on your land on the River Road in Lyme, NH (Map 403 Lot 27) from the River Road to the Connecticut River then compared the distance to two former surveys you provided. The results are as follows

- |  |            |
|--|------------|
| 1) July 10, 1961 K.A. Leclair “Survey for Luke Eaton property”                                 | 943.0 feet |
| 2) April 19, 1989 K.A. Leclair “Survey for Gilbert and Eleanor Mudge”                          | 918.6 feet |
| 3) December 18, 2015 H.J. Burgess measured line between 2 found boundary pins on the same line | 903.1 feet |

In conclusion, it appears that the boundary line has shorted by 40 feet since 1961. The explanation for this must be you are losing land because of erosion or reliction along the boundary with the Connecticut River.

I hope this answers any questions you had

*Harry*  
Harry J. Burgess



HJB/jhb

I have other comments about Study 2/3 and will try to be brief.

### **Empirical Data**

There is no empirical data that supports the conclusions of the Study 2/3 Report. The conclusions in the report are the same as the opinion stated by TransCanada in January 2013 when the company claimed that no studies of erosion were needed. The Study Report includes no technical data to support its conclusions. The author of Study 2/3 has stated that geotechnical studies were not done as a part of this work, but *he has also stated that those studies could be done*. More study of the erosion along the Connecticut River in Vermont and New Hampshire should be done.

### **Erosion Ratio**

The “erosion ratio” is first used on page 82 of Study 2/3, and it is then used in a number of charts and graphs on the following pages. It has been acknowledged that the “erosion ratio” is not an accepted methodology as it has not been peer reviewed and accepted by the geology profession as a whole. The author of Study 2/3 stated that he has used this ratio on other projects, but again, this ratio is not a standard or procedure that has been professionally endorsed and accepted. There is no citation anywhere describing how this ratio has been derived and peer-reviewed to demonstrate that it conforms to the accepted scientific practices and standards of the geology profession. FERC should proceed with great caution before giving too much credence to this ratio. Moreover, this very simplistic approach may fail to determine the causes of erosion in a river that is so controlled by dams.

### **Bank Collapses**

On page 52 of Study 2/3 is a 2015 photo, (Figure 5.4.2-5), of a bank collapse on the Mudge property in Lyme, New Hampshire. On page 62 is a photo, (Figure 5.6.1-2) of a “tunnel scour” in Fairlee, Vermont, that initially formed in 2014. On page 110 is a reference to a bank collapse/bank recession/tunnel scour/circular depression near Route 10 in Hanover, New Hampshire, that I noticed while driving past it. I believe that a complete and thorough study of these three sites, in three towns, would show that this type of erosion is all caused by the same thing— the saturation of the soils when the water level is raised and then, when the water level is lowered, particles of soil are dislodged and carried in suspension away from the bank. In other words, when the water level is lowered the silt-laden water is washed away and the riverbank eventually collapses. Study 2/3 implies that this type of erosion primarily occurs “in the winter months.” That is a totally false and misleading statement. Those of us who live along the river and walk along the riverbank see these holes/recessions/scours being formed at all times of the year. A sinkhole that is today forming on my land is now about a foot deep— deep enough to break a horse’s leg if it trips in it. When will it be six feet deep with a “tunnel



scour” leading to the river? It will only take repeated raising and lowering of the river, a direct result of dam operations, to bring that about.

### **Streambank stability**

One of the requirements for a stable riparian buffer is a strong and healthy root system of the vegetation on the riverbank. Page 71 of Study 2/3 notes that “a bare skeleton of roots are less effective at protecting the bank.” Many of the photographs in the study and in the appendices show either a “skeleton of roots” or root systems that are in a high riverbank and the roots are so far above the water that the trees will topple and fall into the river. Many of the photographs clearly illustrate that there is no root mass there to protect the riverbank from erosion. Study 2/3 includes no drilling of the riverbank to determine the root mass that would help to reduce erosion. Where there is no strong root mass, there will be an unstable riverbank.

### **Land and flowage rights**

Property owners along the river were forced to deed flowage rights to the power company during the construction of the Wilder Dam in 1949-1950. Flowage rights represent a form of ownership of land that is subject to property taxes in both New Hampshire and Vermont. The continued erosion of the land has converted acres of land into acre feet of water, but TransCanada is contesting the taxation of the flowage rights. In New Hampshire, both Hanover and Lyme are being sued by TransCanada over the assessment of the flowage rights. In Vermont, the town of Newbury won its case, (*TransCanada v. Town of Newbury*, Orange County Superior Court, Docket No. 242-10-12 Oecv., January 19, 2016). In that case, TransCanada requested a valuation of \$9,500 for the flowage rights but the court decision was that the flowage rights were worth, \$1,554,124. TransCanada is appealing the decision. TransCanada has lost its appeal of the value of the dam in Rockingham, Vermont. TransCanada asserted that it was worth \$84 million but the court ruled that it was worth \$127.4 million. These lawsuits, and their related costs for small towns, are another example of how TransCanada is in denial about issues concerning the Connecticut River.

### **Statistical confusion**

A sentence on page ES-1, the Executive Summary, of Study 2/3 reads: “Nearly 40 percent of the riverbanks in the study area were mapped as unstable during bank stability mapping completed in 2014.” Is it 40% or is it 58% of the riverbank that is unstable? On page 79 of the study there are these figures: 11% eroding, 22% vegetated eroding, 6% failing armor, 15% armored and 4% “healed erosion” for a total of 58% of the riverbank that either is or has been eroding at some point. Given that the Study also discusses how armoring of the bank has failed

and “healed erosion” may be very questionable, these five classifications must be included in the erosion figure. Therefore, it is 58% of the riverbank, not 40%, that is unstable. Therefore, the unstable bank may be 45% higher than stated in TransCanada’s Executive Summary.

### **Erosion is not an issue only addressed in Studies 1, 2 & 3.**

In my response of July 9, 2016, to Study 33, the Traditional Cultural Properties study dated May 16, 2016, I raised the issue of erosion and how historical and cultural sites were being affected / destroyed by the erosion along the river. I included a photograph, page 4 of my response, taken right beside where in 2015 the Public Archaeological Laboratory (PAL) conducted digs for three weeks on my property.

I also noted in my response that during the meeting on June 1, 2016, a caller from Fairlee, Vermont, familiar with the Phase 2 archaeological dig being done there, had described the erosion at that site.

On August 4, 2016, I received a copy of the August 2016 “privileged report” prepared by PAL that describes their findings on my property. Based upon their findings, PAL recommends that this site, my fields, be added to the National Historic Register. It is a privilege to own such a site and with that privilege comes responsibility.

Page 20 of the PAL report reads: “The riverbank along the wooded field break and field to the south has a steep vertical face and is severely undercut in some locations.” Figure 3-8, page 21 of the PAL report, is a photograph of the erosion and the caption reads, “Photograph of eroded, undercut riverbank along the wooded fieldbreak of the Lampshire Meadow Site (27-GR-232), view northeast.”

Page 48 of the PAL report reads: “PAL recommends that TransCanada take measures to preserve and protect the site, including the establishment of a program to monitor its condition over time and mitigate any identified impacts. The specifics of this archaeological monitoring program and mitigation measures would be identified in a Historic Property Management Plan that will be developed through consultation among the FERC, the NH SHPO and TransCanada in advance of the impending relicensing of the Wilder project.”

The “identified impacts” on this site are very simple, erosion.

My family has already taken steps to preserve this land by placing conservation easements on it that will prohibit any future development.

What steps does TransCanada propose that will prevent any future erosion and destruction of historic sites such as this one? What conditions will FERC impose on the operation of the dams on the Connecticut River so that sites such as this are protected from further destruction?

*Not mentioned in the PAL report is that any plan for and monitoring of this site should be done in consultation with the landowner.*

## Conclusion

1. Additional erosion studies should be done that conform with accepted scientific methods in order to determine the causes of the erosion on the Connecticut River.
2. Study 2/3 notes that a number of erosion control / bank stabilization projects have failed. A study should be undertaken to determine the best way to fix and repair the riverbank and restore the riparian buffer. Federal agencies, towns, and private landowners are spending substantial amounts to protect land and infrastructure but these are often failing after a very short period of time. A study to determine the best way to stabilize the riverbank should be undertaken before more money, public and private, is wasted on projects that will fail.
3. The operating parameters of the dams should be modified. Specifically for Wilder this might mean that the maximum elevation is lowered to 380 feet (from 385) and the maximum daily change is reduced to 2 feet. This will be the new "impoundment level" for the Wilder Dam. There would have to be similar changes for the other dams. The key to controlling the erosion is getting the water away from the highly permeable soil that is the riverbank.
4. Others have suggested, and I concur with their recommendation, that a mitigation fund be established as a part of the relicensing of the dams on the lower Connecticut River. More specifically, I recommend that TransCanada establish a fund of \$250 million. This represents \$1 million per mile along the river in both Vermont and New Hampshire. The \$1 million per mile figure may be low considering the cost of rebuilding 1,200 feet of the River Road in Lyme, New Hampshire, beside the river. The fund should be used exclusively for repairing and restoring the riverbank. The fund should be available to private landowners to fund restoration projects on their land and to compensate them for lost land. The fund should be available to towns to repair public roads along the river. The mitigation fund established in 1997 was only available to non-profit organizations and there have been projects that have received funding from this mitigation fund in towns that have no frontage on the river. A mitigation fund established because of damage to the riverbank should be used only to repair the land along the river.
5. In consultation with landowners, TransCanada should be required to develop a plan that will not only protect known historic sites along the riverbank, but the entire riverbank from further erosion.

Document Content(s)

FERC 1892-026 Study2\_3 Response.PDF.....1-12