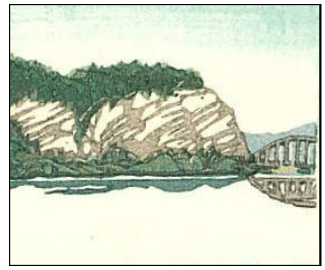
Upper Valley River Subcommittee
New Hampshire – Piermont, Orford, Lyme, Hanover, Lebanon
Vermont – Bradford, Fairlee, Thetford, Norwich, Hartford



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VIA ELECTRONIC FILING

DRAFT January 30, 2018

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E. Room 1-A
Washington, D.C. 20426

Re: Great River Hydro, LLC. ILP Study 2 and Study 3 - Supplement to Final Study Report dated November 15, 2017 for Project Nos. 1892-026, 1855-045, and 1904-073

The Upper Valley Subcommittee (UVRS) of the Connecticut River Joint Commissions is the Local River Management Advisory Committee (LAC) established by New Hampshire law, RSA 483:8-a for the segment of the Connecticut River from Lebanon NH and Hartford VT upstream to Piermont NH and Bradford VT. As authorized by RSA 483:8-a the shall have the duty to "consider and comment on any federal, state, or local government plans to approve, license, fund or construct facilities that would alter the resource values and characteristics for which the river or segment is designated." Our membership, appointed by each of the towns listed above, includes riverfront landowners, resource professionals, and neighbors who observe and use the river all year long – we are the "eyes and ears" for NHDES and regulatory agencies. By informing FERC and TransCanada of the value of our shared public trust resource and the issues associated with dam operations, we are ensuring that the interests of our member towns are considered in the relicensing process.

The UVRS held a public meeting on December 18, 2017 to discuss the ILP Study 2 and Study 3 - Supplement to Final Study Report dated November 15, 2017 (hereinafter referred to as "Supplement"). Members of the UVRS also participated in the meeting the FERC Working Group of CRJC held on February 18, 2017. Drafts of our comments were circulated to individual members of the UVRS for comment.

The UVRS hereby comments on the Scope, Methodology, and Results presented in the Supplement:

1. Scope of Additional Assessment

Scope: The July 21, 2017 Study Plan Determination issued by FERC stated:

> *"Because critical shear stress and near-bank velocities can play a significant role in the erosion process, staff recommends that Great River Hydro file an addendum to the revised study report by November 15, 2017, that includes an analysis of estimated critical shear stress, near-bank velocity, and the potential correlation of these factors with project operation at the 21 monitoring sites. This discussion should include a table for each monitoring site that lists critical shear stresses and near-bank velocities with respect to water surface elevations corresponding to project operation (e.g., minimum flow, average project operating ranges, maximum hydraulic capacity). For each monitoring site, Great River Hydro should describe the river channel features corresponding to each water surface elevation, including stratigraphy, the presence or absence of vegetation, the presence of any visual erosion indicators (e.g., slumps, falls, notching, undercutting), and other notable bank features (e.g., groundwater seeps).*

The FERC determination requested an analysis of not only shear stress and near bank velocities, but also description of "notable bank features". The Supplement describes in detail the "near bank" velocities (i.e. 20 feet away from the bank and 5 feet deep), but does not discuss velocities at the riverbank itself, and does not adequately describe notable bank features, which are clearly eroding in the photos submitted.

Appendix B of the Study Plan Determination issued by FERC stated:

> *"…staff recommends that Great River Hydro include in the November 15, 2017 addendum, an analysis of the stratigraphy at the 21 monitoring sites, including, at a minimum, a discussion of any potential correlation between erosive features (e.g. notches, undercutting) and soils present within normal project operating ranges."*

The Supplement fails to discuss any correlation between erosive features and normal project operations.

Site selection: The Supplement states that " sediment entrainment is highly unlikely at over 75 percent of the sites", and that while "entrainment of bank sediments is considered possible at 5 of the 21 sites based on the analysis, actual entrainment is considered unlikely…" (Executive Summary). None of the 5 sites are in the Wilder Impoundment, which is in our jurisdiction, and where bank erosion is rampant.

2. Methodology

Sediment Entrainment vs. Bank Erosion: The Supplement only analyzes entrainment, which is defined by USGS as the removal and transport of soil particles (particularly larger sizes such as sand) from the bed of the river channel. There is no supplemental analysis of bank erosion, which is defined as the removal of soil particles (particularly smaller particles such as silts and clays) from the bank of the river due to shear stresses from any of the five forces (waves, water level fluctuation, overland flow, groundwater seepage, and river flow).

Near-bank vs. edge of bank: The Supplement describes in detail the "near bank" velocities (i.e. 20 feet away from the bank and 5 feet deep) and claims "shear stress and velocity would be close to zero at the water's edge" due to "natural edge effects" (p. 9). UVRS members are unanimous in their observations that the edge of bank velocities can be considerable and, in some cases, accelerated by flow over or around natural edge features such as logs, rocks and eddies. In fact, a riverbank stabilization project that we have been monitoring for several years has had damage to large logs and rocks used for stabilization, caused by increased velocities at an inside bend of the river, where the current is always faster.

Computer modeling vs. empirical observation: The Supplement describes in detail the methodologies using HEC-RAS hydraulic modeling and published shear stress data to make conclusions about soil entrainment at the 20-foot out/5-foot deep "near-bank" location. Soil samples from each site, taken from the water's edge at typical WSE elevations. These soil samples appear to be colluvial soil washed down from the upper parts of the bank. This would seem to indicate erosion was happening, and the banks were not "stable" as claimed in the Supplement. Although observations were made in August and September of 2017, there appears to be no empirical data presented which would indicate bank erosion and river velocities at each site. Computer models and predictions were used, rather than direct visual observation and on-site flow measurements.

Shear stress: UVRS members have observed active erosion, seepage, overland flow, heavy rainfall, and inshore currents, all of which create turbidity in the water. The silts and clays are mostly held in suspension, while the coarser sands fall by gravity to the edge of the water. Obviously, soil shear stress has been exceeded on the bank, and erosion is occurring on a regular and continued basis.

The Erosion Cycle: As stated on page ES-1 the Executive Summary of the original Study Report:

> *Bank erosion in the study area is a cyclic process that begins with the formation of notches and overhangs at the base of the bank. The resulting over-steepening at the bank's base destabilizes the upper bank generating planar slips, rotational slumps, topples, and flows that transfer bank material downslope. Material supplied from the erosion of the upper bank accumulates at the base of the bank and can ultimately lead to the stabilization of the bank unless the sediment and fallen trees are removed by river currents, wave action, groundwater seepage, or other forces. If the material is removed, the notching at the base of the bank can begin afresh and the cycle of erosion*

repeated.

Also on page ES-3 of the original Study Report*:*

> *The notching at the base of the banks that initiates the cycle of erosion can result from a variety of potential factors such as flood flows, wave action, seepage forces generated by natural groundwater flows, or water level fluctuations. Material eroded from the upper bank accumulates at the base of the bank and if removed transverse to the bank by seepage forces or wave action can ultimately lead to the creation of a gently sloping beach face and stabilization of the bank.*

Also on page 60 of the original Study Report*:*

> *Water currents strong enough to erode and transport sediment in the study area are potentially generated by at least five different mechanisms: waves, water level fluctuations, overland flow, groundwater seeps, and tractive forces (e.g., shear stress) generated by river flow (particularly during higher discharges). Currents or river flow, by whichever mechanism, acting at the base of the bank over prolonged (although not necessarily continuous) periods of time can create the notches and overhangs seen at the base of 37% of the river's banks (see Section 5.6.4).*

Therefore, we can assume the following:

Factors:
- waves
- water level fluctuations
- overland flow
- groundwater seeps
- river flow

Create:
- notches
- overhangs

Causing:
- over-steepening
- planar slips
- rotational slumps
- topples
- flows downslope

Result:
- bank erosion

Conclusion: UVRS continues to assert that WSE fluctuations, caused by "normal project operations" constantly expose and undercut the soils on the banks. When subjected to the above forces of water that exceed shear stress, these soils erode and move downstream. Wave action also tears away at exposed riverbanks, both from seasonal boat traffic, and from year-long wind-generated waves on long fetches, which are common in the Wilder impoundment. During flood discharges (and rapid draw-downs in anticipation of flooding), exposed soils are subjected to higher velocities and erosion rates are increased.

Respectfully submitted,

James S. Kennedy, chair
Upper Valley Subcommittee (UVRS)
Connecticut River Joint Commissions