

The State of New Hampshire DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner



August 29, 2013

Kimberly D. Bose, Secretary Federal Energy Regulatory Commission 888 First Street, NE Washington, D.C. 20426

RE: Comments on Revised Study Plan for FERC No. 1892 (Wilder), 1855 (Bellows Falls) and 1904 (Vernon)

Dear Secretary Bose:

The New Hampshire Department of Environmental Services (NHDES) is responsible for issuing federal Clean Water Act § 401 water quality certifications (401 certifications) in New Hampshire. State statutory authority for issuing 401 certifications is provided in RSA 485-A:12, III. NHDES is also responsible for establishing and administering surface water quality standards for New Hampshire.

NHDES has reviewed the revised study plan (RSP) filed by TransCanada on August 14, 2013 for the following three hydroelectric projects on the Connecticut River:

Wilder Project (FERC No. 1892) Bellows Falls Project (FERC No. 1855) Vernon Project (FERC No. 1904)

Comments on the RSP are attached. Please note that NHDES also supports the comments submitted by the New Hampshire Fish and Game Department.

We thank you for the opportunity to comment. Should you have any questions, please do not hesitate to contact either myself (602-271-2983) or Owen David (603-271-0699.

Sincerely,

Gregg Constack

Gregg Comstock, P.E. Supervisor, Water Quality Planning Section New Hampshire Department of Environmental Services

August 29, 2013 New Hampshire Department of Environmental Services(NHDES) Comments on TransCanada Hydro Northeast Inc (TC) Revised Study Plan (RSP) dated August 14, 2013 for Wilder Hydroelectric Project (FERC Project No. 1892-026) Ballows Fella Hydroelectric Project (FERC Project No. 1892-026)

Bellows Falls Hydroelectric Project (FERC Project No. 1855-045) Vernon Hydroelectric Project (FERC Project No. 1904-073)

NHDES's latest comments and responses are provided below in *bold italics* and are prefaced with the date 8/29/13 (i.e., 8/29/13 NHDES Comment or 8/29/13 NHDES Response). In most cases NHDES's comment submitted on 7/15/13 is provided followed by the Applicant's response of 8/14/13 followed by NHDES's response of 8/29/13.

General Comments:

(1) 8/29/13 NHDES Comment: In addition to our previous comments and the comments below, comments submitted by the New Hampshire Fish and Game Department are supported by NHDES and are considered part of this document.

(2) 8/29/13 NHDES Comment: Similar to FirstLight's submittal, and to facilitate review, TransCanada's RSP submittal should have included a mark-up showing all changes made to the document.

(3) 7/15/13 NHDES Comment: 2. Many studies mention stakeholder workgroups (such as the erosion working group for Study #2) that will be consulted prior to and during various stages of the studies. NHDES requests to be on these working groups.

8/14/13 Applicant Response: No response found.

8/29/13 NHDES Response: To our knowledge, this comment has not been addressed.

TransCanada / FirstLight Project-Affected Areas

(1) 7/15/13 NHDES Comment: 1. The extent of TransCanada's and FirstLight's study responsibilities downstream of the Vernon dam should be clarified so that study plan responsibilities can be assigned appropriately. It is our understanding at this time that TransCanada's studies will extend to the NH/MA border.

p.4, last paragraph. It is stated that "... evaluation of Vernon Project impacts to the section below Vernon dam has been included in the updated study plans." The distance downstream of the dam should be stated.

8/14/13 Applicant Response: p.11. of the RSP states that "TransCanada's RSP includes an examination and assessment of the Vernon Project operational effects on resources and habitat from a point just below Stebbins Island, approximately 1.5 miles downstream" and that "Evaluation of Vernon Project effects in this section below Vernon dam has been included in all appropriate revised study plans."

8/29/13 NHDES Response: It is unclear how this distance (1.5 miles) was determined and if FirstLight has agreed to this as the upstream limit of their studies. NHDES requests that FERC render a decision that clearly indicates the extent of TransCanada's and FirstLight's study responsibilities downstream of the Vernon Dam to the NH/MA border to ensure that the area between the Vernon Dam and the NH/MA border is covered by the requested studies.

TC Proposed Study #1: Historic Riverbank Position and Erosion Study Relevant NHDES Study Requests: 21a, 21b, 21c.

(1) 7/15/13 NHDES Comment: p. 17, Analysis. It is stated that this study will attempt to correlate bank loss to a specific period or time frame, historical hydrological events, or other causal agents. NHDES requests that "other causal agents" include historical changes in the operation of the three projects. This information should provide further insight as to how project operations have potentially affected riverbank erosion.

8/14/13 Applicant Response: "The study plan has been revised to state: "The analysis of potential causal agents will include an investigation of whether flood frequency, project operations, tributary inputs, or other conditions (e.g., bank armoring) have changed during periods and at locations where significant erosion has been identified. Correlations between erosion and other changes along the river could potentially identify the causes for erosion; however, there have been no historic changes in operations since minimum flows were established in mid-1970's."

8/29/13 NHDES Response: TransCanada added project operations as one of several causal agents that will be analyzed. NHDES understands that the analysis will include changes in the frequency, duration and magnitude of pond fluctuations and discharges over the years caused by project operation and hydrologic events at each of the three projects. A statement to this effect should be added to the proposed study.

TC Proposed Study #2: Riverbank Transect Study Relevant NHDES Study Requests: 21a, 21b, 21c.

(1) 7/15/13 NHDES Comment: p. 19, Study Goals and Objectives, 1st paragraph. This section states that the goal is to monitor riverbank erosion at selected sites in the impoundments and project-affected riverine sections below the Wilder and Bellows Falls dams. This sentence should be revised to include sites up and downstream of the Vernon dam which would be consistent with p. 21, Study Area and Study Sites, where it is stated that 4 transects associated with the Vernon dam will be monitored.

8/14/13 Applicant Response: "The study plan's goals and objectives have been revised to include the 1.5 mile section below Vernon dam, specified in other studies. The site on the NH bank immediately below Vernon dam has been monitored for many years and information from that on-going monitoring will be included in some manner in this study."

8/29/13 NHDES Response: p. 19 of the RSP, Study Goals and Objectives, 1st paragraph, last sentence states that "... the goal of this study is to monitor riverbank erosion at selected sites in the impoundments and project affected riverine sections below Wilder and Bellows Falls Dams." This is inconsistent with the Applicants' response above and should therefore be revised to read "... the goal of this study is to monitor riverbank erosion at selected sites in the impoundments and project affected riverbank erosion at selected sites in the impoundments and project affected riverbank erosion at selected sites in the impoundments and project affected riverbank erosion at selected sites in the impoundments and project affected riverbank erosion selected sites in the impoundments and project affected riverbank erosion selected sites and Vernon Dams."

NH Dept of Environmental Services Comments on TransCanada Revised Proposed Study Plan for FERC Project #s 1892, 1855, 1904 8/29/13

p. 21 of the RSP, Study Area and Study Sites, where it is stated that 4 transects associated with the Vernon dam will be monitored. Further, our requested revision is consistent with p.22, Site Selection, where it is stated that final monitoring sites will be selected in collaboration with the erosion working group.

(2) 7/15/13 NHDES Comment: p. 22, Establishing Monitoring Sites and Repeat Surveys. The accuracy of the topographic, bathymetric and repeat surveys should be specified. It is stated that data will be collected at sufficient density to accurately describe the slope geometry. This should be specified. The density will need to be quite high to detect changes in riverbank geometry that may be primarily attributable to project operation. In its study request, NHDES proposed installation of horizontal pins into the bank to help measure erosion over the short and long term. If the density of survey points is not considered high enough to detect subtle changes in riverbank geometry, NHDES will likely request that pins be installed as described in its original study request.

8/14/13 Applicant Response: "The study plan has been revised to specify accuracy. With regard to density, the density of survey data will discern erosion amounts of 0.1 ft or less over all, or even a small portion, of the bank height. In addition, survey points will be taken at every marked change in bank slope with at least 10 survey points to be measured from the top to bottom of the bank. Installation of horizontal pins can disturb soil in such a way that alters local erosion. The detailed topographic surveys using an electronic total station as proposed in the study plan would provide more reliable measures of erosion rates."

8/29/13 NHDES Response: on p. 22, the RSP states that cross sections will extend from a point 50 feet upland from the top of bank to a wadeable depth into the water with survey points taken at every marked change in bank slope with at least 10 survey points measured from the top to bottom of the bank. This procedure is predicted to detect erosion amounts of 0.1 feet or less over all or even a small portion of bank height.

To eliminate subjectivity (i.e., how do you determine a marked change in slope?) and to improve accuracy of the surveys, NHDES requests that survey points be taken at least every foot as well as where there are significant changes in bank slopes. To detect any changes in the bank geometry due primarily to daily water level fluctuations at the dams, the study should also state that surveys will be conducted when water levels in the impoundments are at their typical lowest daily level.

NHDES also requests that the study plan describe how changes in the undercut areas along the riverbanks will be accurately surveyed. These are areas that are prone to impacts by project water level fluctuations and are not amenable to use of survey rods.

(3) 7/15/13 NHDES Comment: p. 22 and p 23, Repeat Surveys. On p.22 it is stated that surveys at the 20 sites will be resurveyed and ground photographs retaken at least four times per year for 2 years. On p. 23 it is stated that while NHDES and others requested monitoring of several bank transects on a biweekly basis for one year at 18 monitoring stations (three in each impoundment and three downstream of each dam), this additional monitoring is not incorporated into this study as such information will only be valuable if active soil loss occurs nearly continuously throughout the year. This assumes that soil loss is not occurring continuously with no data to support this assumption. To determine if soil loss is occurring nearly continuously and to help isolate the potential affects of daily project operation on riverbank erosion and instability NHDES requests that biweekly surveys be conducted throughout the year as originally proposed in our study requests.

8/14/13 Applicant Response: "The study plan has been revised to include consultation with the erosion working group and consideration of increased monitoring based on initial surveys and any information gleaned from the historic data research in Study 1 - Historical Riverbank Position and Erosion that supports the need for more periodic monitoring based upon significant erosion rates."

8/29/13 NHDES Response: The RSP did not include our requested revision and proposes only 4 surveys per year at each of the 20 transects for 2 years. However the RSP did add that TransCanada will consult with the erosion working group during the 2 year monitoring period to discuss the need for, and locations of, increased sampling frequency based on initial monitoring results and any information gleaned from historical data research in Study 1.

Gathering data once every 3 months does not seem sufficient for determining erosion impacts due primarily to daily dam operation. As an interim measure, NHDES therefore requests that in addition to the surveys proposed by TransCanada, biweekly surveys be conducted at approximately 12 sites (approximately 4 per dam with final sites determined by the erosion workgroup), for three months (July through September) when fluctuations in the river are more apt to be primarily due to daily dam operation. This combined with the higher resolution surveys requested above, should help isolate the impact of the dam operation on bank erosion. This should be done for at least two years. Depending on results from the first year, the survey frequency may be increased and/or the number of stations with increased survey frequency may be increased the following year.

(4) 7/15/13 NHDES Comment: p. 23, Surface Water Level Monitoring. The accuracy of the pressure transducers used to measure water levels should be specified. This section also states that the pressure transducers will be removed during the winter months to avoid breakage but that since flow variation is generally limited in the winter months, the absence of data collection in the winter months should not alter study results. NHDES disagrees that the absence of water level data in the winter months will not alter results. As shown in the figure provided in our study request that is based on data from the USGS gage located downstream of the Bellows Falls Project in North Walpole, water levels due to project operation fluctuated significantly in January 2013. The study plan should therefore address how water level fluctuation in the river during the winter will be accounted for and how it could potentially impact erosion along the riverbank.

8/14/13 Applicant Response: "The study plan has been revised to specify that transducers will be set to automatically record water levels at 15-minute intervals and will be able to measure changes in water levels with an accuracy of 0.02 ft. We note that the study plan reference (removed from the revised plan) to winter flow variation would have been more correctly stated as "flow variation *outside of the daily project operations* is generally limited in the winter months due to frozen precipitation." Winter daily normal operations will not be very different from other periods in the year in terms of the range of elevation changes and flows, so the absence of data collection in the winter months should not alter the study. In addition, we are concerned about damage to stilling wells and monitors from icing during winter and propose to remove monitors during the first winter. However, the study plan has been revised to allow for leaving monitors in during the second winter at up to 6 sites (one upstream and one downstream of each dam) where no damage to stilling wells occurred during the first winter. In addition, the modeling in Studies 4 and 5 will develop stage flow relationships that are equally applicable throughout the year will describe how water levels fluctuate throughout the reservoirs and downstream reaches - at erosion sites and other resource areas."

8/29/13 NHDES Response: p. 23 of the RSP states the following: "Data will be retrieved from the transducers each time surveying is scheduled at the monitoring sites. The pressure transducers will be removed during the first winter to prevent breakage, but the stilling wells will remain in place to

ease redeployment of the transducers in the second year. If most of the stilling wells are not damaged by icing during the first winter, six transducers will remain in place during the second winter (one upstream and one downstream of each project). Flow records at the dams in conjunction with hydraulic modeling will be used to provide information on fluctuations in water levels at the monitoring sites where water-level monitors are removed for the winter. The modeling will develop stageflow relationships that are equally applicable throughout the year, and the hydraulic modeling and operations modeling will describe how water levels fluctuate throughout the reservoirs and downstream reaches at erosion sites and other resource areas."

In general, NHDES concurs with this approach but requests that the study be revised to indicate that the transducers will remain in place for as long a possible during the winter of the first year and second year. If potential ice damage is the main concern, the transducers during the first year should be left in place until the river begins to freeze over and then re-installed as soon as ice no longer poses a threat. The same would hold true for all transducers in the second year with the exception (as proposed in the RSP) that six transducers will be installed throughout the winter if the stilling wells are not damaged during the first winter.

TC Proposed Study #3: Riverbank Erosion Study Relevant NHDES Study Requests: 21a, 21b, 21c

(1) 7/15/13 NHDES Comment: p. 26, Study Goals and Objectives. Consistent with our study requests, the objectives of this study should address the following:

1. determine how water level fluctuations within the minimum and maximum operating range and discharges from peaking operations at the Wilder, Bellows Falls and Vernon hydroelectric projects contribute to shoreline erosion;

8/14/13 Applicant Response: "The study plan includes an objective to "ascertain the likely causes of erosion (e.g., high flows, groundwater seeps, eddies, water level fluctuations related to project operations). This inherently encompasses the full range of project flows and discharges."

8/29/13 NHDES Response: To make this intent clear in the study plan, NHDES requests that the objective be revised to read "ascertain the likely causes of erosion (e.g., high flows, groundwater seeps, eddies, full range of water level fluctuations related to project operations)".

2. identify and determine the effects of shoreline bank erosion and riverbank failure on other resources (i.e. riparian areas and shoreline wetlands, rare plant and animal populations, water quality, aquatic and terrestrial wildlife habitat, etc.);

8/14/13 Applicant Response: "The study plan has been revised in the objectives section to clarify this objective by stating "identify the effects of project operation related shoreline erosion on other resources (e.g., riparian areas and shoreline wetlands, rare plant and animal populations, water quality, aquatic and terrestrial wildlife habitat)."

8/29/13 NHDES Response: It appears this comment has been addressed.

3. identify techniques that could be used to mitigate the effects of project operations or other mitigation techniques that could be developed to reduce on riverbank erosion within the impoundment and downstream of the tailrace.

8/14/13 Applicant Response: "Potential techniques or operational changes that might be used to mitigate project effects cannot be determined until the study has been completed. As applicable and feasible, these will be proposed and included in the project's license applications, Exhibit E–Environmental Report."

8/29/13 NHDES Response: The Applicant's response is open-ended and does not guarantee this comment will be addressed. Since it is likely that project operations have some effect on erosion, NHDES requests that the study include language confirming that techniques or operational changes that could be used to mitigate project effects on riverbank erosion will be included in the study or the project's license application.

(2) 7/15/13 NHDES Comment: p. 31, Stratigraphic Descriptions, last sentence on this page. The accuracy of the survey grade GPS should be specified.

8/14/13 Applicant Response: p. 33 of the RSP states that "the accuracy of the GPS surveys should be within 0.2 foot horizontally and vertically but will depend on the distance from the base station".

8/29/13 NHDES Response: The response to this comment is open-ended. NHDES requests that the study specify the minimum accuracy based on the maximum distance from the base station so that one can determine if this method is appropriate.

(3) 7/15/13 NHDES Comment: p. 33, Analysis and p. 34 Deliverables.

-The study should compare the water elevations due to project operation to the elevation along the riverbanks below which there is a lack of vegetation, undercutting, etc. and determine if there is a correlation.

8/14/13 Applicant Response: "The study plan includes two objectives that address the comment including: characterizing the processes of erosion; and ascertaining the likely causes of erosion in project-affected areas."

8/29/13 NHDES Response: To make it clear in the study that this comment will be addressed, NHDES requests that language be added to this study that clearly indicates that the objectives include comparison of water elevations due to project operation to the elevation along the riverbanks below which there is a lack of vegetation, undercutting, etc. to determine if there is a correlation.

-The study should also address the potential of daily project operations making the riverbanks more prone to massive erosion (i.e., due to lack of vegetation, undercutting, etc.) and how this may impact the frequency and magnitude of erosion when high flows occur. The study should also address how daily project water level fluctuations may impact groundwater levels and movement within the riverbank and the extent to which this may be destabilizing the banks and making them more prone to erosion failure under higher flows. 8/14/13 Applicant Response: "We interpret the commenter's use of the terms "high flows" and "higher flows" to refer to flows outside of the normal range of project operations. As such, evaluation of those flows is beyond the scope of this study. However, in response to the comment, the study plan has been revised to include provisions for consultation with the erosion working group on the need for additional study based on the results of this study."

8/29/13 NHDES Response: NHDES respectfully disagrees with this approach. These are important factors that may impact erosion and should be addressed in the first year and in the interim study report. NHDES therefore requests that the study include an approach for addressing these topics in the first year with provisions for consultation with the erosion working group on the need for additional study based on the results of the interim study. NHDES recommends consideration of the FirstLight's approach (study plan 3.1.2) for evaluating the impact of repeated wetting and drying of riverbank soils due to water level fluctuations on riverbank stability. Their study includes, but is not limited to, data from groundwater wells to study the relationship between flow, water surface level and groundwater level, riverbank sediment characteristics including shear strength, erodibility, bulk density, and particle size, and modeling using BSTEM.

-The analysis should also evaluate how changes in operation of the Projects may affect riverbank erosion along the river."

8/14/13 Applicant Response: "TransCanada is not proposing changes in project operations. The goal of this study is to assess the effects of current project operations on riverbank erosion."

8/29/13 NHDES Response: NHDES respectfully disagrees. Although TransCanada is not proposing any revisions in project operation, the final license may require operational changes. To help inform the decision-making process the study should therefore evaluate how changes in operation of the Projects may affect riverbank erosion along the river. For example, if the projects were operated in instantaneous run-of-river, how might this impact the extent, frequency and rate of riverbank erosion? Would it likely be more or less and if so to what extent and why?

TC Proposed Study #4: Hydraulic Modeling Study

Relevant NHDES Study Requests: 14a

(1) 7/15/13 NHDES Comment: p. 43, Hydraulic Model Calibration and Verification. It is stated that calibration and verification will be based on a range of observed flows and water surface elevation from USGS gages and water level logger data. Figure 4-1 on p. 40 indicates that the model will be used to predict velocities which will be used in other studies. Considering the importance of velocity on erosion, aquatic habitat, etc., NHDES recommends that calibration of the model include comparison of predicted velocities at several cross sections to measured velocities.

8/14/13 Applicant Response: "The study plan has been revised to indicate that velocities measured in 2013 will be compared to average velocities computed by the HEC-RAS model, as available and applicable." Further p. 44 of the RSP states the following: "c. Velocities measured in 2013 will be compared to average velocities computed by the HEC-RAS model, as available and applicable."

8/29/13 NHDES Response: NHDES considers this response to be vague and requests that the location and number of transects where velocity measurements have been or will be made be

specified in the RSP and that the measured flow and water surface elevation at each transect during the velocity measurements will be provided in the report as this data will assist calibration. The RSP should also indicate that average velocities computed by the HEC-RAS model will be compared to the average measured velocity across each transect as well as the measured velocity at various points across each transect to see how velocity varies across the channel, and especially near -shore. Such information is of interest for the erosion and aquatic habitat studies.

(2) 7/15/13 NHDES Comment: p. 44. Sub-Hourly Flow and Elevation Rate-of-Change. It is stated that 5 modeling scenarios of 24 hours each will be run. The study plan should reflect that additional runs may be needed depending on the results and comments received from the reviewing agencies.

8/14/13 Applicant Response: "The study plan has been revised to include provisions for additional model runs as applicable, based on model results, results and needs of other resource studies and working group comments."

8/29/13 NHDES Response: It was not clear to NHDES where these provisions were included in the text of this study plan. NHDES therefore requests that the this study plan be revised to indicate that additional model runs will be conducted based on model results, results and needs of other resource studies and working group comments."

TC Proposed Study #5: Operations Modeling Study

Relevant NHDES Study Requests: 14a

(1) 7/15/13 NHDES Comment: p. 49, Study Goals and Objectives. The study request submitted by NHDES requested that modeling be conducted to evaluate the potential effects of climate-altered flows on project operations over the course of the license. TransCanada's proposal does not address this objective, but should. Given studies such as those by researchers at the University of New Hampshire¹ that show that flood and drought frequency in New Hampshire has changed over the past 40 years, and is very likely to continue to change, climate change scenarios are necessary. Much of this type of modeling is already underway around the state, though not in the Connecticut River. NHDES requests that TransCanada address how they will evaluate the potential effects of climate-altered flows on project operations over the course of the license in their study plan.

8/14/13 Applicant Response: Appendix E of the RSP states that TransCanada, for various reasons, respectfully disagrees.

8/29/13 NHDES Response: NHDES respectfully disagrees and for the reasons stated above, NHDES once again requests that TransCanada address how they will evaluate the potential effects of climate-altered flows on project operations over the course of the license in their study plan.

(2) 7/15/13 NHDES Comment: p. 50, Methods. It is stated that a 5 year subset of the available 30 years of inflow were selected based on the annual and spring inflow volumes at Vernon and the annual energy

¹ Hayhoe, K., C. P. Wake, T. G. Huntington, L. Luo, M. D. Schwartz, J. Sheffield, E. Wood, B. Anderson and J. Bradbury. 2007. Past and future changes in climate and hydrological indicators in the US Northeast. *Climate Dynamics*, 28(4), 381 - 407

production. The study should clarify if the rankings are based on 1 being the lowest or highest inflow volume or annual energy production.

8/14/13 Applicant Response: "The selection was based on ranking annual and spring total inflow volumes at Vernon and the system annual energy production from the lowest (1) to the highest (30) and searching for seasonal variability between the five selected hydrologies"

8/29/13 NHDES Response: It appears this comment has been addressed.

(3) 7/15/13 NHDES Comment: p. 50, Methods. To better predict long term continuous impacts, it would be better to run all 30 years rather than a 5 year subset. It would seem that once the various relationships in the model are set up, it would not be difficult to run the model for all 30 years. Based on this understanding, NHDES requests that this be done.

8/14/13 Applicant Response: "The study plan has been revised to clarify the rationale for not running the model for all 30 years, as follows: "Information on operational impacts can be well provided by a properly selected representative subset of the hydrology. The selected subset represents a range of flow conditions both annually and seasonally. The subset also represents a wide range of annual energy production and thus reflects the actual TransCanada interference in the river regime."

8/29/13 NHDES Response: Running the model for five non-consecutive years will not provide complete information on the year-to-year and long-term (30 year) impact of the projects on the ecosystem. Running the model for 30 consecutive years will allow display of the historical variability, determination of the frequency and duration and calculation of statistics such as the mean, median maximum and minimum, standard deviation, etc. Once the model output is in a database, this information is not difficult to provide. NHDES therefore requests that the study indicate that the model will be run for 30 consecutive years and that the analysis provide the previously described information. NHDES also requests that the model be run for 30 years assuming instantaneous run-of-river at all three dams with data analyzed as described above. This will provide valuable information on the possible range of results and provide a relative idea of the sensitivity of the model and system.

(4) 7/15/13 NHDES Comment: p. 56. Sub-Hourly Model Consideration. Our interpretation of this section is that model runs assuming different project operation will only be run if the erosion, aquatic and terrestrial groups raise concerns based on model results assuming current project operations. One of the objectives in our study request was to compare hourly discharge and water surface elevations at various locations at current and proposed operating conditions to model results assuming instantaneous run-of-river at the Projects. Running the model assuming instantaneous run-of-river will help place bounds on the possible range of results and provide a relative idea of the sensitivity of the model. NHDES therefore requests that this scenario be run.

8/14/13 Applicant Response: "Similar to the model using an hourly time-step, a subhourly model will first examine current operating procedures to identify resource impacts on a resource of concern (referred to as the base case). Such subhourly examinations will focus on discharge rates of change or flow changes over a finite period. In the event that the rate of change of water level and/or flow at the downstream econodes in the sub-hourly base case scenario is judged to be problematic to a specific reach or resource, an alternative unit loading/unloading policy that would affect the rate and magnitude will be analysed in a similar sub-hourly time-step."

8/29/13 NHDES Response: For the reasons stated above, NHDES once again requests that the model be run assuming instantaneous run-of-river to place bounds on the possible range of results and provide a relative idea of the sensitivity of the model and system.

TC Proposed Study #6: Water Quality Monitoring Study

Relevant NHDES Study Requests: 22a, 22b, 22c; 25a, 25b, 25c.

(1) 7/15/13 NHDES Comment: General: The information in this study includes some, but not all, of what is typically required in a sampling and analysis plan. DES requests that the Applicant submit a detailed sampling and analysis plan to NHDES for approval, that includes quality assurance provisions, to ensure the data will be useable for water quality standards attainment decisions.

8/14/13 Applicant Response: "The study plan presently includes a general section on quality control and quality assurance. The study plan has been revised to state that TransCanada will submit for approval to VANR and NHDES, a detailed sampling and analysis (S&A) plan consistent with the FERC approved study plan prior to implementation of the study. The S&A plan will include all elements of water quality monitoring described in the study plan and more detailed quality assurance descriptions as requested in the comment."

8/29/13 NHDES Response: p. 65 (Study Area and Study Sites) and p. 69 (Methods) of the RSP states that the Sampling and Analysis plan will be submitted to NHDES and VANR "for review and comment". This needs to be revised to "for review and approval" as originally requested by NHDES and as represented by the Applicant in their response.

(2) 7/15/13 NHDES Comment: p.62, Table 6-1 Summary of water quality station locations, 2014. This indicates that the most downstream datalogger (V-TR) is at RM 141.8 which is less than two tenths of mile downstream of the Vernon Dam. It is our understanding that TC (and/or FirstLight) will conduct water quality monitoring further downstream to the NH/MA border. Additional stations should be added to the study to ensure that more of the approximate 5.5 mile reach from the Vernon Dam to the NH/MA border is monitored.

8/14/13 TC Response: "Our water quality monitoring approach for the Vernon project is similar to that for the Wilder and Bellows Falls projects, where monitoring downstream of the dam occurs in the tailrace. According to FirstLight's updated Proposed Study Plan, they will be monitoring water quality at two stations between our V-TR station and the NH/MA border".

8/29/13 NHDES Response: NHDES will the make a final determination of the number and location of sampling stations when we review the Sampling and Analysis Plan.

(3) 7/15/13 NHDES Comment: p. 63, Figure 6-1. The plan showing the locations of the monitoring stations is illegible. A larger scale plan, as well as aerial photos of each sampling station (mainstem and tributaries) and the approximate water depth at each proposed sampling location should be provided with the sampling and analysis plan.

8/14/13 Applicant Response: "The study plan has been revised to add the approximate depths of nine stations where vertical water quality profiles were sampled during 2012, but the depth of the remaining seven mainstem stations in this study and those in the 10 tributaries where water temperature will be monitored cannot be estimated until those locations are established in the field.

The study plan has been revised to state that TransCanada will submit for approval to VANR and NHDES, a detailed sampling and analysis (S&A) plan consistent with the FERC-approved study plan prior to implementation of the study. The S&A plan will include all elements of water quality monitoring described in the study plan, including approximate water depths and more detailed mapping of station locations as requested in the comment."

8/29/13 NHDES Response: NHDES will the make a final determination of the number and location of sampling stations when we review the Sampling and Analysis Plan.

(4) 7/15/13 NHDES Comment: p. 64, Methods, 1st paragraph. It is stated that turbidity probes will be added to the mainstem Connecticut River multi-parameter datasondes. As stated in our study requests, placement of turbidity dataloggers should also be coordinated with other studies regarding erosion. For example dataloggers located closer to the river bank will be more likely to capture potential plumes associated with erosion. Dataloggers should be placed near shore just below the lower operating elevation of the projects and up and downstream of reference sites (i.e. sites with little potential for erosion) and sites with a higher potential for erosion. NHDES requests that this be addressed in the study. Data collected in this manner will help identify the impact of project operations on sediment movement/ erosion in the Connecticut River.

8/14/13 Applicant Response: TransCanada respectfully disagrees that placement of additional turbidity data loggers beyond those proposed is appropriate for this study. The study plan has included turbidity measurements with its multiparameter probes. Other studies (Study 2 – Riverbank Transect Study and Study 3 – Riverbank Erosion Study) will evaluate erosion in the Connecticut River and ascertain the impact of project operations. In addition Study 8 – Channel Morphology and Benthic Habitats Study will help to identify the effects of project operations on sediment transport as it relates to aquatic habitat."

8/29/13 NHDES Response: For the reasons stated above NHDES once again requests that dataloggers with turbidity probes also be placed near shore just below the lower operating elevation of the projects and up and downstream of reference sites (i.e. sites with little potential for erosion) and sites with a higher potential for erosion. Details should be provided in the Sampling and Analysis Plan submitted to NHDES for approval.

(5) 7/15/13 NHDES Comment: p.64, Methods. In order to compare results to NH surface water quality criteria for dissolved oxygen in impoundments, and as stated in our study requests (25a, 25b, 25c), "Dataloggers deployed in the impoundment should be set at the bottom of the epilimnion (if stratified) or at 25% depth if not stratified. A vertical dissolved oxygen and water temperature profile should be conducted at the time of deployment of dataloggers in the impounded section to determine if river is stratified and thus the appropriate depth for deployment." This should be included in the sampling and analysis plan.

8/14/13 Applicant Response: "The study plan has been revised to describe the depth of the deployed datasondes that will measure dissolved oxygen and to state that TransCanada will submit for approval to VANR and NHDES, a detailed sampling and analysis (S&A) plan consistent with the FERC-approved study plan prior to implementation of the study. The S&A plan will include all elements of water quality monitoring described in the study plan, including details on data logger deployment as requested in the comment."

8/29/13 NHDES Response: NHDES will make a final determination when we review the Sampling and Analysis Plan.

NH Dept of Environmental Services Comments on TransCanada Revised Proposed Study Plan for FERC Project #s 1892, 1855, 1904 8/29/13

(6) 7/15/13 NHDES Comment: p.67, Quality Assurance and Quality Control Procedures and Objectives. The study does not specify the accuracy of all field monitoring equipment, or the laboratory methods and reporting limits for nitrate/nitrite, Kjeldahl nitrogen, total phosphorus and chlorophyll-a. This information should be included in the sampling and analysis plan.

8/14/13 Applicant Response: "The study plan has been revised to state that TransCanada will submit for approval to VANR and NHDES, a detailed sampling and analysis (S&A) plan consistent with the FERC-approved study plan prior to implementation of the study. The S&A plan will include all elements of water quality monitoring described in the study plan including equipment accuracy, laboratory methods and reporting limits as requested in the comment."

8/29/13 NHDES Response: NHDES will make a final determination when we review the Sampling and Analysis Plan.

(7) 7/15/13 NHDES Comment: p.68, Instrument Calibration and Frequency, 1st paragraph, 2nd sentence. This section indicates that the sondes at the continuous stations will only be checked halfway through the 10-day low flow period. This appears to contradict the second paragraph on p. 65 which states the continuous monitors will be maintained, calibrated and data downloaded on a weekly basis. All continuous monitors (not just those deployed for the 10-day low flow monitoring) should be maintained, calibrated, and data downloaded at a least every week. The study plan should be revised accordingly.

p 68, Instrument Calibration and Frequency, 1st paragraph, 1st sentence. This section states that calibration will be per the manufacturer's instructions. The calibration standards for dissolved oxygen (we calibrate to saturation and zero dissolved oxygen), pH, turbidity, specific conductance, and temperature should be included in the sampling and analysis plan.

8/14/13 Applicant Response: "The study plan has been revised to state that TransCanada will submit for approval to VANR and NHDES, a detailed sampling and analysis (S&A) plan consistent with the FERC-approved study plan prior to implementation of the study. The S&A plan will include all elements of water quality monitoring described in the study plan including details on instrument calibration as requested in the comment. The study plan has also been revised to clarify that when conditions allow, we will attempt to conduct weekly calibration and downloading of all datasondes used to measure dissolved oxygen will occur, and data will be downloaded from water temperature data loggers at approximately biweekly intervals. Actual download frequency will be based on several factors (e.g., flows, study schedules, weather conditions, crew safety)."

8/29/13 NHDES Response: NHDES will make a final determination when we review the Sampling and Analysis Plan.

(8) 7/15/13 NHDES Comment: p. 69, Analysis. It is stated that results will be compared to impoundment elevation. Results at all stations (not just the impoundment stations) should be compared to water surface elevation measured at or near each station. Also, the sampling and analysis plan should specify how flow in the bypass reach will be determined for the duration of the water quality study.

8/14/13 Applicant Response: "The study plan has been revised to clarify that results from all stations, not just impoundment stations, will be compared to water surface elevations. The study plan has been revised to state that TransCanada will submit for approval to VANR and NHDES, a detailed sampling and analysis (S&A) plan consistent with the FERC-approved study plan prior to implementation of the study. The S&A plan will include all elements of water quality monitoring described in the study plan

including a description of how flows in the Bellows Falls bypassed reach will be determined, as requested in the comment."

8/29/13 NHDES Response: Applicant's response appears acceptable. NHDES will make a final determination when we review the Sampling and Analysis Plan.

(9) 7/15/13 NHDES Comment: p. 70. Schedule. Monitoring is proposed for 2014. The study plan should reflect that if river flows in 2014 do not include representative low flow, high temperature conditions, additional monitoring will likely be necessary in 2015.

8/14/13 Applicant Response: "We will rely on the ILP regulations and defer to FERC in addressing anomaly conditions requiring an additional study year. Throughout the study, consultation will occur, and progress reports and the draft study report will be shared with the working group."

8/29/13 NHDES Response: As we originally requested, the plan should reflect that if river flows in 2014 do not include representative low flow, high temperature conditions, additional monitoring will likely be necessary in 2015.

TC Proposed Study #9: Instream Flow Study

Relevant NHDES Study Requests: 5, 10

(1) 7/15/13 NHDES Comment: General: Minimum flows are mentioned in several sections of this study. NHDES uses the term protective flows which may mean more than one protective flow at each Project. It should be made clear that the study will address the magnitude, frequency, duration, timing and rate of change of a range of flows when determining flows needed to provide suitable habitat for the selected target organisms.

8/14/13 Applicant Response: "We note that the goal of the study is to "assess aquatic resources and habitat...under flow conditions affected by project operations." This necessarily includes the entire range of flows from the licensed minimum flows (and the higher generated flows used as minimum flow); up to station capacity flows. The type of information requested in the comment will be provided from the time series analysis."

8/29/13 NHDES Response: The Applicant acknowledges that the requested information will be provided from the time series analysis. To be clear, NHDES requests that the study explicitly state that to determine flows needed to provide suitable habitat for the selected target organisms the study will address the magnitude, frequency, duration, timing and rate of change of a range of flows.

(2) 7/15/13 NHDES Comment: p. 106. Study Reach, Study Site, and Transect Selection, last bullet. It is stated that preliminary river reaches include Vernon dam downstream approximately 1.5 miles. Please specify how was this distance was determined to be the riverine section downstream of the Vernon dam.

8/14/13 Applicant Response: "The Introduction section of the RSP document of which this study plan is a part, has been revised to include our rationale as follows: "TransCanada acknowledges that under certain circumstances (extreme low Turners Falls impoundment conditions) the reach below Vernon dam may experience the effect of Vernon discharge to a greater extent than during normal

conditions. Therefore, the evaluation of Vernon Project impacts to the section below Vernon dam has been included in the revised study plans. However, TransCanada also proposes that the context of these evaluations include an examination of the frequency, duration and periodicity of such conditions where Vernon dam discharge is a significant and material influencing factor above those associated with FirstLight projects."

8/29/13 NHDES Response: See NHDES Response under "TransCanada / FirstLight Project-Affected Areas" above.

(3) 7/15/13 NHDES Comment: p. 108, Hydraulic Data Collection, 2nd paragraph, 1st sentence. It is stated that one complete set of depths and velocities will be taken at each transect at the target high flow or the flow level that can be effectively and safely measured. DES recommends that at a minimum another complete set of velocity and depth measurements be taken at or near the low range of agreed upon study flows so that the model can be properly calibrated. Also please specify the accuracy of the velocity meters.

8/14/13 Applicant Response: "TransCanada respectfully disagrees that an additional set of depths and velocities is needed for model calibration. Bovee (1997) and Bovee et al. (1998) indicate that a single set of velocities at the highest possible flow is preferred. Payne and Bremm (2003) evaluated the effect of multiple velocity calibration sets on the habitat index and concluded that generated habitat index results using a single velocity set deviate only slightly from those incorporating three or more velocity sets. For example, see Bovee, K.D. 1997. Data collection procedures for the Physical Habitat Simulation System. U.S. Geological Survey, Biological Resources Division, Ft. Collins, CO. 141 pp.; Bovee, K.D., B.L. Lamb, J.M. Bartholow, C.B. Stalnaker, J. Taylor, and J. Henriksen. 1998. Stream habitat analysis using the instream flow incremental methodology. U.S. Geological Survey, Biological Resources Division Information and Technology Report USGS/BRD-1998-0004. viii + 131 pp.; and Payne, "T.R., and D.J. Bremm. 2003. The influence of multiple velocity calibration sets on the PHABSIM habitat index. Paper presented to International IFIM User's Workshop, June 1-5, 2003, Ft. Collins, CO. (Document Attached). TransCanada therefore believes that this additional study element is unnecessary and costly and as an additional requirement does not meet ILP Study Criteria 4, 6 and 7. The study plan has been revised to include the accuracy to velocity meters."

8/29/13 NHDES Response: Since velocity is an important parameter in the analysis coupled with the fact that velocity/ flow relationships are site specific, NHDES respectfully disagrees and again requests that, at a minimum, another complete set of velocity and depth measurements be taken at or near the low range of agreed upon study flows so that the model can be properly calibrated.

NHDES notes that FirstLight's study of operation impacts on erosion and bank instability (study plan 3.1.2, p. 3-28 of the mark-up RSP), states the following: "Hydraulic (near shore velocity), bank material sampling, and suspended sediment sampling were conducted over a range of flow conditions from 1997 through 2011. These data provide information on velocity, hydraulic shear stresses, particle size distributions, and sediment transport." This emphasizes the importance of having measured velocity data (including near shore) to properly determine the impacts of erosion and other factors on the ecosystem.

(4) 7/15/13 NHDES Comment: p.110, Field Data Collection (2-D), 2nd paragraph, 2nd sentence. It is stated that single calibration flow with associated water surface elevations is required for a 2-D site, although additional flows and elevations can assist with model calibration. DES recommends that calibration be based on at least 2 sets of flow and water surface elevation that bracket the range of agreed upon study flows.

8/14/13 Applicant Response: We have revised the study plan by adding text stating that additional flow and stage data for 2-D sites will be collected in conjunction with 1D transect data collection.

8/29/13 NHDES Response: It appears this comment has been addressed.

(5) 7/15/13 NHDES Comment: p. 105, Methods. As stated in our study requests 5 and 10, "Dataloggers should be deployed in each reach during the study to continuously monitor dissolved oxygen and temperature for comparison to State water quality standards." This should be addressed in the proposed study plan.

8/14/13 Applicant Response: "TransCanada respectfully disagrees that DO and temperature recording is appropriate or necessary for this study. Currently in the study plan water quality parameters (temperature, DO, pH, and conductivity, and turbidity), water depth and velocity will be recorded for each full transect randomly selected sample segment. We note that Study 6 – Water Quality includes monitoring of DO and temperature as well as other water quality parameters for the purpose of comparison to state water quality standards. Supplemental water quality data will also be provided in several other studies, making it unnecessary to collect such data in this study. TransCanada believes that the requested additional study element on its own does not meet the ILP Study Criteria in the context of what we are proposing. The information it will provide as "existing information" does not meet Criterion 4. The methodology we are proposing in the current study plan, absent the additional elements being requested, is generally accepted practice in the scientific community or appropriate and therefore the additional scope is not necessary to meet Criterion 6. The additional scope on its own has a cost and effort that does not warrant inclusion when compared to what we are proposing (the alternative) and therefore does not meet Criterion 7."

8/29/13 NHDES Response: NHDES' concern is that in the reaches below each of the three dams and in the Bellows Falls Bypass reach, dissolved oxygen, temperature and flow data is available for the range of proposed protected flows in each reach. This information is necessary to determine if any of the proposed instream flows will likely violate New Hampshire dissolved oxygen standards. Continuous dataloggers deployed for at least 24 hours are needed to determine compliance with state criterion for average daily percent dissolved oxygen saturation. It's not clear if this information will be provided. NHDES requests that the study state that this information will be provided and include details in the Sampling and Analysis Plan submitted to DES for approval as required in Study #6.

TC Proposed Study #27: Floodplain, Wetland, Riparian, and Littoral Habitats Study

Relevant NHDES Study Requests: 15a

(1) 7/15/13 NHDES Comment: p. 260, Methods and p. 64, Deliverables. NHDES requests that the study plan 1) indicate use of field GPS units (with accuracy specified) for mapping, 2) that data will be uploaded and annotated in GIS so that plant species and their distribution are all georeferenced, and 3) that the shapefiles generated from the field work will be shared with resource agencies such as NHDES.

8/14/13 Applicant Response: "The study plan has been revised to indicate that locations of representative habitats will be groundverified using sub-meter GPS. The final GIS maps will include cover types for all communities. Site specific data will be limited to the representative habitats and will be provided in the report."

8/29/13 NHDES Response: NHDES requests the GIS shapefiles be shared with resource agencies such as NHDES.

In addition, p. 268, Study Area and Study Sites, states that the study area will extend from to the top of the Wilder impoundment downstream to approximately 1.5 miles below the Vernon dam. This is satisfactory provided First Light conducts a similar study from this point downstream to the NH/MA border. It is not clear how far upstream FirstLight's study will end. As stated in a previous response, NHDES requests that FERC render a decision that clearly indicates the extent of TransCanada's and FirstLight's study responsibilities downstream of the Vernon Dam to the NH/MA border to ensure that the area between the Vernon Dam and the NH/MA border is covered by the requested studies.

20130829-5138 FERC PDF (Unofficial) 8/29/2013 2:16:49 PM
Document Content(s)
20130829_NHDES_Comments_on_TC_RSP.PDF1-18