Great River Hydro

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June 24, 2021

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

Re: Great River Hydro, LLC; FERC Project Nos. 1855-050, 1892-030 and 1904-078; Response to FERC Additional Information Request dated April 30, 2021

Dear Secretary Bose:

Great River Hydro, LLC ("Great River Hydro" or "GRH"), owner and licensee of the Vernon (P-1904), Bellows Falls (P-1855) and Wilder (P-1892) Projects respectfully provides the following responses to the Additional Information Request dated April 30, 2021.

Responses to AIR issued April 30, 2021

AIR 1: Commission staff's February 12, 2021 letter, requested that Great River provide information on flow releases from each project dam and powerhouse for 2009, 2015, 2016, and 2017, for current operation, simulated run-of-river operation, and simulated modified run-of-river operation.1 Great River's March 30, 2021 response, combines the dam and powerhouse flow releases for each respective project, and does not show the flow releases separately for each powerhouse and each dam. So that staff can analyze the effects of the proposed projects on flows downstream of the respective project dams and powerhouses, please file the flow release information separately for each project powerhouse and each project dam. Please provide this information for 2009, 2015, 2016, and 2017 for: (1) current operation, (2) simulated run-of-river operation, and (3) simulated modified run-of-river operation.

GRH Response:
In the spreadsheet attachment to this letter, GRH provides hourly flow data related to current operations, simulated inflow equals outflow (IEO) operation, and the illustrative GRH Proposed IEO/Flex Operation (demonstrated in months of February, June, August, and November) for the calendar years of 2009, 2015, 2016 and 2017. The flows are identified as Total Station

Discharge (generation flow only), Total Project Discharge equaling Total Station Discharge plus Spill (non-generation flow) and Spill flows over or through the dam plus fishway related flows. The information is found on spreadsheet tabs labeled, 2009 Flows; 2015 Flows; 2016 Flows; and 2017 Flows.

AIR2: The simulation model outputs for run-of-river operation in 2009, 2015, 2016, and 2017, filed on March 30, 2021, include significantly higher water volumes than actual, historical water volumes at each project. The differences are significant on a monthly and annual basis, and are not consistent between projects, with the Bellows Falls Project having the largest relative difference between modeled and historical volumes. Please revise the response to staff's February 12, 2021 letter, so that the simulation model outputs for run-of-river operation (e.g., flow releases from each dam and powerhouse), include monthly water volumes that are accurate to within 1 percent of the actual monthly historical water volumes for each project for 2009, 2015, 2016, and 2017.

GRH Response:
Great River Hydro is unable to comply with this request particularly within a 60-day period stipulated in FERC's AIR letter of April 29, 2021. We believe this request is extremely onerous given the challenge of reconciling historic flow data that is based on turbine generator and spill gate rating curves with flow data used in simulations of GRH's Proposed Alternative Operation derived from: a previously developed dataset for inflow into the Wilder Project, then routed through the three Project impoundments based on simplistic simulated operation with additional estimated contributing inflow to the impoundments. It is not simply a matter of adjusting the simulation model, it would require re-development of the inflow dataset developed and accepted under Study 5. GRH would argue the necessity for matching historic flow with model-based inflow to an accuracy of 1% is unnecessary and without purpose.

The table below represents the most up-to-date volumetric totals for current operation, simulated IEO without discretionary flexible operation, and the GRH Proposed Alternative IEO/Flex Operation (IEO with limited discretionary dispatch deviating from IEO). GRH re-examined all historic data as well as simulation inflow and discharge data and made minor corrections where flows appeared to be mis-represented in prior filings. Examples of these include, incorporating the additional day in the Leap Year of 2016 and accounting for continuous leakage in the Bellow Falls bypassed reach. Neither of these achieved the goal of reconciliation within 1% of historic flows. Fundamentally, the GRH proposed alternative simulation did not introduce additional flow into the system or modify upstream Fifteen Mile Falls Project operation. The simulation model used historic inflow to the Wilder Project as its original basis.

Side-by-side comparisons of Current Operation, IEO and IEO/Flex operation hourly flows for each project for each of the four years is provided in the spreadsheet attachment to this AIR response in tabs labeled: 2009 Flows; 2015 Flows; 2016 Flows; and 2017 Flows. Additionally, charts depicting the monthly volumetric total for each of these three operational modes are provided in the spreadsheet under tabs labeled: 2009 Monthly Q Volume Chart; 2015 Monthly Q Volume Chart; 2016 Monthly Q Volume Chart; and 2017 Monthly Q Volume Chart. By observing these charts one can see that while the flows are different, they track closely with one

another (monthly distributions are similar) and that is more important that volumetric totals for the purpose of evaluating impacts and depicting the GRH Proposed Alternative Operation. Annual Volumetric Totals are summarized in Table A2-1 below. An example of the Monthly Volumetric Flow Total comparison chart is shown below as Figure A2-1.

Table A2-1 Comparison of Total Annual Volumetric Project Discharge

	Total Annual Volumetric Project Discharge in cubic feet per second/hour; Percentages are of Current Operation Flow				
	Current Operation	**IEO**	**%**	**IEO/Flex**	**%**
2009					
Wilder	57,033,942	57,795,617	1%	57,792,874	1%
Bellows Falls	99,056,241	101,103,672	2%	101,103,672	2%
Vernon	112,819,998	113,740,945	1%	113,740,945	1%
2015					
Wilder	45,632,488	46,843,094	3%	46,843,094	3%
Bellows Falls	74,345,435	78,420,574	5%	78,420,574	5%
Vernon	85,263,804	89,189,572	4%	89,189,572	4%
2016					
Wilder	41,497,593	42,556,811	2%	42,556,811	2%
Bellows Falls	66,757,210	71,782,720	7%	71,782,720	7%
Vernon	75,909,444	79,453,252	4%	79,453,252	4%
2017					
Wilder	55,816,053	56,199,254	1%	56,199,254	1%
Bellows Falls	90,442,742	97,364,860	7%	97,366,251	7%
Vernon	107,440,475	112,618,150	5%	112,618,150	5%

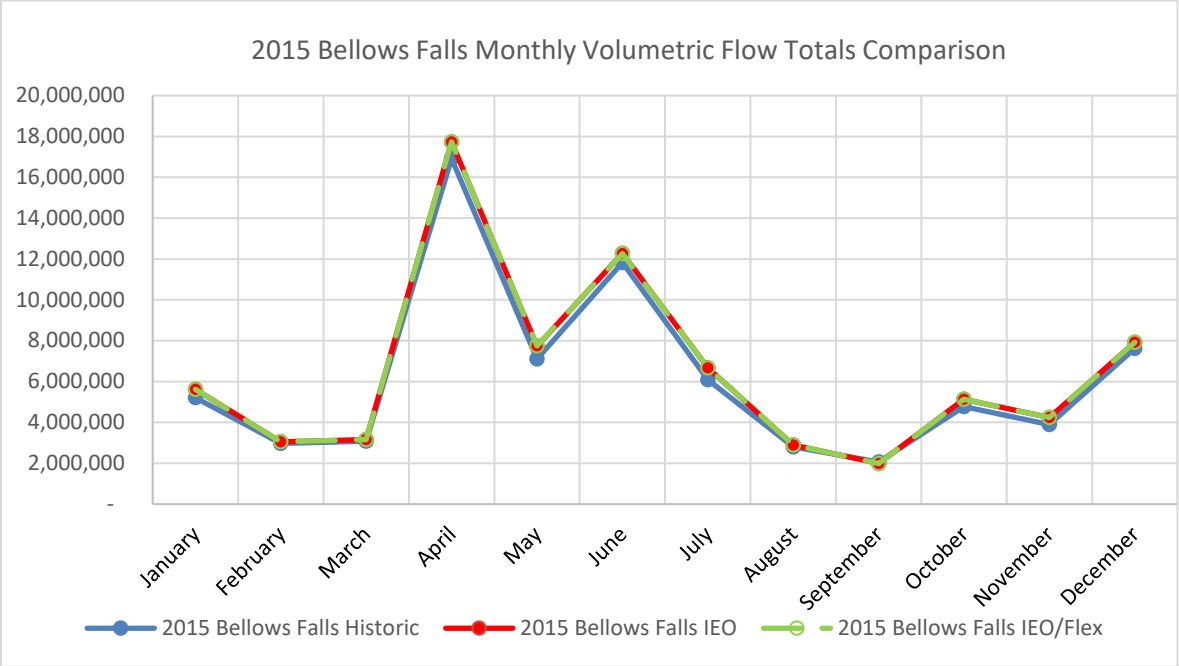

Figure A2-1. Comparison of monthly volumetric flow totals at the Bellows Falls Project for the year 2015 under current (historic) operation, simulated IEO, and proposed simulated IEO/Flex.

Evaluations and comparisons of the effects on resources between current operations and the GRH Proposed Alternative should not rely upon volumetric flow totals. Such evaluations and comparisons between current operations and the GRH Proposed Operation should rely upon and consider the differences at the sub-daily or hourly timestep level. In the spreadsheet accompanying this letter, hourly discharge and water surface elevation (WSEL) data has been provided. Previously, GRH provided nodal WSEL data on an hourly time-step for the purpose of evaluating effect on WSEL throughout the impoundments and reaches downstream of the projects. The hour-to-hour changes shown in this data are not significantly influenced by the difference volumetric totals. The distinctions between current and proposed operations are very significant and obvious when comparing how current operations affect flows and WSELs at the dam and below the dam on an hour-to-hour basis and how that is drastically improved under the GRH Proposed Alternative. Four sample weeks from each of the simulated IEO/Flex months in each of the simulated four years were selected to illustrate the improvement from current operation to the GRH Proposed Alternative when looked at in terms of hourly change. Hourly station dispatch changes in flow and WSEL for the sample weeks at each Project is plotted and presented in the accompanying spreadsheet under separate tabs labeled for each year, for flow and WSEL: 2009 H'rly Flow Δ; 2009 H'rly Elev Δ; 2015 H'rly Flow Δ; 2015 H'rly Elev Δ; 2016 H'rly Flow Δ; 2016 H'rly Elev Δ; 2017 H'rly Flow Δ; 2017 H'rly Elev Δ. Example of these charts are shown below in Figures A2-2 and A2-3.

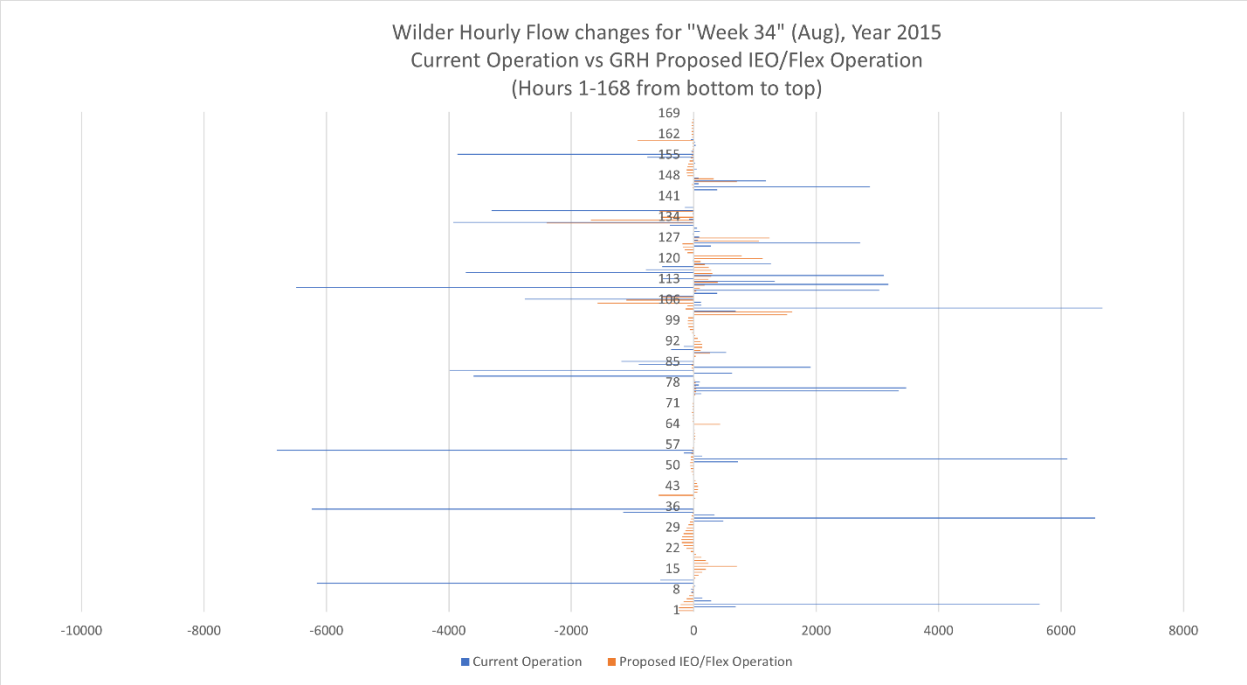

Figure A2-2 Comparison of hourly changes in station discharge (cfs) for a week in August 2015 between current operation and simulated proposed IEO/Flex operation.

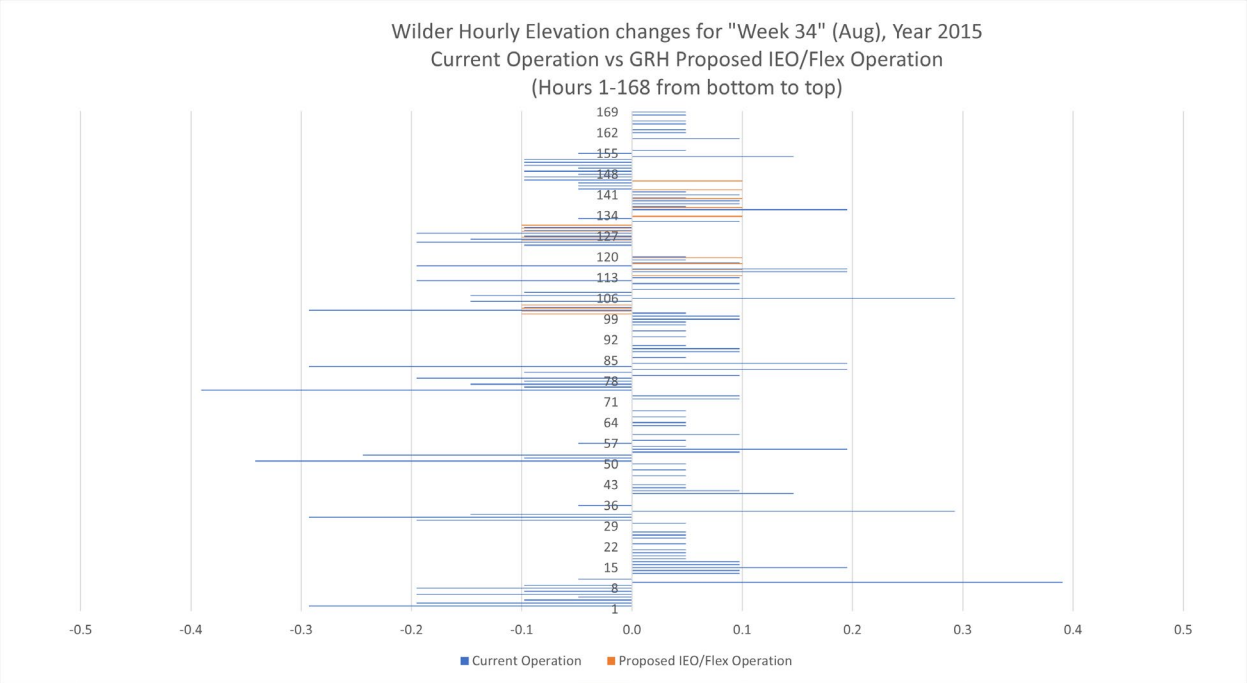

Figure A2-3 Comparison of hourly changes in WSEL (feet) at Wilder Dam for a week in August 2015 between current operation and simulated proposed IEO/Flex operation.

Lastly, none of the flow dependent or WSEL dependent analyses performed for approved relicensing studies used historic operating data. They relied upon the Study 5 Operations Model to evaluate current operation utilizing the raw annual inflow dataset similar to the inflow for simulations of the GRH Proposed Alternative (inflow into the Wilder Project from upstream, routed downstream, plus contributing nodal inflow between dams). As stated previously, we could not adapt the Study 5 Operations Model to operate discretionary dispatch hours as provided by the GRH Proposed Alternative IEO/Flex operation.

AIR 3. Please estimate the annual generation production associated with run-of-river operation for each project.

GRH Response:
The GRH Proposed Alternative IEO/Flex operation includes up to 412 hours (4.7% of hours in a year) of limited discretionary flexible generation, plus added generation during transition in advance and subsequent to designated flex hours. While there is no proposed alternative incorporating a 100% IEO mode, GRH assumes its response to this AIR is intended to provide staff a sense of whether the incorporation of up to 412 hours of discretionary generation plus transitional generation significantly changes annual total energy production. The simple answer is there is no significant difference between a 100% IEO operation and the added flexible and transitional generating period. This is largely due to the proposed operation allowing for greater (than IEO) generation in some hours but also requires reduced (less than potential IEO) generation in subsequent hours in order to return the WSEL at the dam to the target elevation required under the proposed operation. Estimates of annual generation production in such a hypothetical 100% IEO operation are shown in Table A3-1 below.

Table A3-1 Estimates of Annual Energy (MWh) under a hypothetical IEO mode of operation.

	Wilder	Bellows Falls	Vernon
10-year average annual MWh (Exh B 2.1)	156,303	239,070	158,028
Estimated Change in Annual MWh under IEO operation including proposed 300 cfs minimum flow in Bellows Falls bypassed reach	2.2% increase	3.0 % decrease	1.7% increase
Estimated Annual MWh under IEO operation	3,439	2,478	2,686
Annual MWh due to GRH Proposed 300 cfs minimum flow in Bellows Falls bypassed reach	N/A	(9,650) MWh	N/A
Estimated total average annual MWh	159,742	231,898	160,714

While we were unable to fully respond to one of the three outstanding AIR's, I trust the answers provide adequate supplemental information to the amended applications filed on December 7, 2020. We hope that this filing together with the updated Supporting Design Reports for the three Projects will render our applications complete and ready for environmental assessment. If there are further questions regarding this matter, please contact me at 603-498-2851 or jragonese@greatriverhydro.com. Thank you for your consideration.

Sincerely,

John L. Ragonese
FERC License Manager

Information electronically filed with this letter:
HistoricSimIEOSimIEOFlex062421AIRResponseSupportData.xlsx
spreadsheet file