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NEW YORK STATE | NY Power Authority

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JUSTIN E. DRISCOLL
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March 16, 2023

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

RE: Crescent Hydroelectric Project (P-4678) and
Vischer Ferry Hydroelectric Project (P-4679)
Request for Delay in Issuance of Ready for Environmental Analysis Notice and
Update on Reduction and Mitigation of Ice Jam Efforts on the Mohawk
River/Barge Canal

Dear Secretary Bose:

The Power Authority of the State of New York (Power Authority or NYPA) filed its Final License Application for the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project (Projects) with the Federal Energy Regulatory Commission (FERC or Commission) on May 25, 2022. The Commission issued an Additional Information Request (AIR) on August 1, 2022; the Power Authority provided its response on October 28, 2022. On December 22, 2022, the Power Authority submitted a letter seeking a 90-day delay in the Commission's issuance of the Ready for Environmental Analysis (REA) Notice to facilitate ongoing settlement discussions; and provided a brief update on NYPA's ongoing efforts to reduce and mitigate ice jams on the Mohawk River/Barge Canal. On January 19, 2023, the Commission issued a Request for Additional Information (AIR) relative to the ice jam mitigation work at Vischer Ferry, specifically, the details of NYPA's preferred alternative, including the length of each of the crest gates and the computational modeling results of the preferred alternative relative to the January 2018 ice jam event.

For background, on July 30, 2021, the Power Authority filed "A Numerical Model Study on Ice Jam Flooding in the Lower Mohawk River" (Study) conducted near the Vischer Ferry Project as part of the Reimagine the Canals initiative announced in January 2020. This version contained Critical Energy Infrastructure Information (CEII) information, thereby preventing public review. At the request of the Commission, the Power Authority filed the Study as "public" on March 31, 2022. As noted in the March 2022 filing, "It should be noted that the Study is an initial investigation. The conclusions and interventions described therein are preliminary and are currently being refined and updated based on additional data collected since the Study was originally published."

In response to the Commission's AIR of January 19, 2023, NYPA confirms its preferred selection of installing 27-inch pneumatically actuated crest gates (crest gates) on Dams D and E, and a combination of 27-inch and 48-inch crest gates on Dam F. The top elevation of the proposed crest gates will be the same as the existing fixed flashboards currently installed for navigation purposes each year. See Attachment A.

Since the June 2021 study was re-submitted to the Commission on March 31, 2022, NYPA, in cooperation with Clarkson University (Clarkson), performed additional modeling of dam modification alternatives, including a variety of pneumatically actuated and hydraulically operated crest gate configurations on Dam D. The configuration of crest gates on Dam E and F remained virtually the same (as noted above) for all model runs.

After considering over thirty alternatives, NYPA selected four (4) Vischer Ferry Dam Modification (VFDM) "preliminary" alternatives, which were modeled by Clarkson. These are summarized in Table 1 below. The main difference between these alternatives is the different crest gate heights and two types of crest gate actuation. The proposed design is intended to maintain the navigation season impoundment elevation year-round. Alternatives P-1, P-2, and P-3 include the 27-inch, 48-inch, and 72-inch pneumatically actuated crest gates, while alternative P-4 uses 72-inch hydraulicly operated crest gates. Differing numbers and sizes of piers and crest walls are required to support the various crest gate sizes. The operation of the proposed crest gates on Dam D is expected to facilitate the ice discharge over the dam resulting in a reduction of ice jam flooding potential upstream of the dam. A preliminary report in September 2022 by Clarkson[1] showed alternative P-4 increases the ice jam formation at Dam D due to the hydraulic obstruction of the numerous, wide gate piers required to support the crest gate hydraulic components. Therefore, alternative P-4 was eliminated from further study.

Beginning in the winter of 2020-21, a sheet ice-breaking operation was implemented with a tugboat to break an open channel in the ice cover upstream of Vischer Ferry Dam. The operation enhances the transport of breakup ice floes and reduces the ice jam flooding potential. The future combination of ice breaking and flow regulation at Vischer Ferry Dam with the proposed crest gates is expected to further enhance the ice jam mitigation. Furthermore, the proposed winter strategy will maintain the water level at the top of the crest gates in a fully closed (raised) position. This full pond condition is anticipated to improve ice transport by increasing the water surface gradient and the discharge over Dam D when all sections of Dam D crest gates are fully opened (lowered). Depending on river flow, temporarily suspending generation at the Vischer Ferry Hydroelectric project may be required to provide sufficient flow depth to convey the ice fragments over Dam D.

[1] Huang, F and Shen, H.T, September 2022. Effect of Vischer Ferry Dam Modification Alternatives on Ice Jam Flooding (Draft). Department of Civil & Environmental Engineering, Clarkson University, Potsdam, NY.

ALTERNATIVE NUMBER	DAM	CREST GATE DESCRIPTION	CREST GATE CONFIGURATION	TOTAL GATE WIDTH	TOTAL PIER & WALL WIDTH	TOTAL DAM LENGTH
P-1	D	27" High Pnuematically Actuated Crest Gate	4 Sections 180' with 3 Piers @ 3' and 6' of crest wall	720	15	735
P-2	D	48" High Pnuematically Actuated Crest Gate	4 Sections 180' with 3 Piers @ 4' and 3' of crest wall	720	15	735
P-3	D	72" High Pnuematically Actuated Crest Gate	3 Sections @ 180' plus 1 Section @ 160' with 3 Piers @ 6' and 17' of crest wall	700	35	735
P-4	D	72" High Hydraulically Actuated Crest Gate	7 Sections @ 95' with 8 Piers @ 8' and 6' of crest wall	665	70	735
P-1, P-2, P-3, P-4	E	27" High Pnuematically Actuated Crest Gate	3 Sections @ 220 ' with 2 piers @ 3' and 16' of crest wall	660	22	682
P-1, P-2, P-3, P-4	F	27" High Pnuematically Actuated Crest Gate	2 Sections @ 200' with 1 pier @ 3' and 3' of crest wall	400	6	502
		27" High Pnuematically Actuated Crest Gate	1 Section @ 20' for Fish Bypass with 2 piers @ 3'	20	6	
		48" High Pnuematically Actuated Crest Gate	1 Section @ 60' for Trash Sluice with 1 Pier @ 4' and 6' of crest wall	60	10	

Table 1. Modification Alternatives at Vischer Ferry Dam (measurement units are in feet)

The three remaining alternatives presented in Table 1 (P-1, P-2, P-3) have the same Dam E and F configurations with crest gates, but with different configurations on Dam D. The top elevation of the proposed crest gates on Dam D, E, and F are the same as the existing fixed flashboards installed annually. Alternative P-1 allows the operation of 27-inch crest gates on Dam D. Alternative P-2 enables the operation of 48-inch crest gates on Dam D with the concrete (permanent) crest lowered 21 inches. Alternative P-3 allows the operation of 72-inch-high crest gates on Dam D with 45 inches of the concrete crest removed.

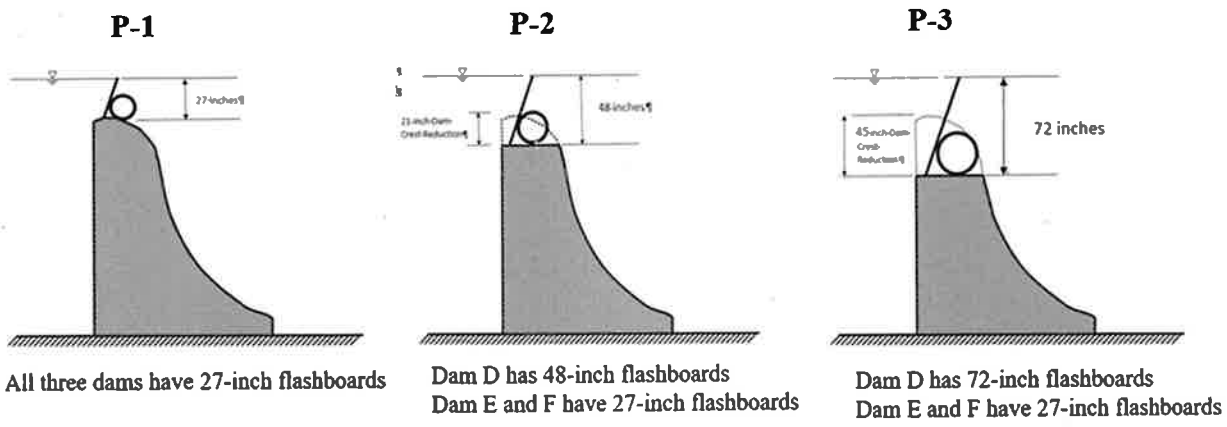


Figure 1. Three design alternates with pneumatically actuated crest gate (flashboard replacement) installed at Vischer Ferry Dam D.

The January 2018 ice jam event that inundated the Stockade District is used as the baseline case for the Vischer Ferry Dam mitigation evaluation because it was the only event with sufficient field data to allow a detailed analysis. The flow and ice conditions have a recurrence period of about two years[2].

The evaluation of the ice jam mitigation alternatives at the Vischer Ferry Dam consists of two stages: Stage 1 is the pre-breakup stage with the ice-breaking operation; Stage 2 is the breakup ice run stage during the breakup event. Stage 1 was modeled for the period between January 1 and 12, 2018, for the pre-breakup period with the ice-breaking operation. Stage 2 was modeled for analyzing the ice run and jam during the breakup event on January 13. The dam operation with the different design options, identified in Figure 1, was examined for the ability to allow the ice floes from the ice-breaking operation and the breakup ice to run from upstream to pass the dam and reduce ice jam-induced flooding within the study reach.

The simulations conducted for the P-1, P-2, and P-3 configurations, shown in Table 1 and Figure 1, were performed to evaluate the effectiveness in reducing ice jam formation and flooding potential. The modeled operational strategy is to fully lower the crest gates on Dam D while maintaining the crest gates on Dams E and F at the fully closed (raised) position. The model analysis for each alternative assumed an open channel created by the current ice-breaking operation in the main channel. Sheet ice along the shoreline was modeled to remain in place. Powerhouse generation was assumed to be suspended at the beginning of the run to allow sufficient flow necessary to move the ice through the impoundment and over Dam D.

[2] Avery, Kenneth, July 21, 2022 (Revised October 25, 2022). FOIL Exempt DRAFT Document DR 4480 HMGP Support – Documentation of Riverine and Ice Jam Average Annual Damage Approach and Estimates for VFD Modifications Summary Memo, Bergmann.

As discussed previously, these evaluations are simulated by the model in the following two stages:

- Pre-breakup Period (Stage 1) – January 1 to 12, 2018

At the beginning of the run, all crest gates are fully raised, and the water level at the dam is at the top of the crest gates. An ice breaker is deployed to break a track in the ice cover along the main flow path upstream of Vischer Ferry Dam. The crest gates on Dam D are then fully opened, as described in Table 1, to pass the ice fragments resulting from the ice-breaking operations. After the ice has reached equilibrium (ice movement is observed to have stopped), the crest gates are closed (raised), and the water level upstream of the dam is restored to the top of the crest gates. This operation may be repeated if ice remains in the main channel.

- Breakup Period (Stage 2) – January 13, 2018

The second stage simulates the breakup that occurred on January 13. The crest gates are initially in the fully closed (raised) position. Generation at the Vischer Ferry Hydroelectric project is suspended. The crest gates on Dam D are fully opened (lowered) starting at 3 am before the peak discharge approaches Vischer Ferry Dam at 10 am, January 13, 2018. The intervention with the opening of the crest gates is expected to facilitate ice movement through a flow constriction upstream of the impoundment (i.e., the Knolls area) passing over the Vischer Ferry Dam and reducing the ice jam flooding potential during the breakup period. The crest gates on Dam E and F remain fully closed (raised) during the simulation.

Observations based on computational modeling of the three alternatives include:

- Alternative P-1 (27-inch-high crest gates): The simulation confirms that ice fragments can smoothly pass the dam. No ice accumulation at Knolls or at Dam D occurs. This is due to moderate ice flow rate and mild water surface gradient at low discharge conditions. The force acting on the ice fragments is relatively uniform. The suspension of powerhouse generation discharge provides sufficient flow depth for ice flow over Dam D. (See Attachment A)
- Alternative P-2 (48-inch-high crest gates): Ice fragments in the impoundment can pass Dam D after fully lowering the crest gates. Ice fragments from upstream accumulate at the Knolls, slowing ice movement, but still can move downstream due to the increased water surface gradient. Additionally, ice fragments accumulate between Dam D and the Knolls after the discharge over the Dam decreases. Periodically raising and lowering the flashboards to alternately restore pond level and repeat discharge capability over Dam D would release the ice accumulations and flush out the loose ice fragments.
- Alternative P-3 (72-inch-high crest gates): The larger opening at Dam D leads to a steeper water surface slope than Alternatives P-1 or P-2 and enables the flushing of more ice fragments during Stage 1. Ice floes can pass the Knolls constriction to Vischer Ferry Dam. However, ice fragments accumulate between Dam D and the Knolls after the discharge over Dam decreases. Periodically raising and lowering the flashboards to alternately restore pond level and repeat discharge capability over Dam D would release the ice accumulations and flush out the loose ice fragments.

In summary, the three modeled alternatives, P-1, P-2 and P-3 provide favorable benefits for the downstream transport of ice fragments. Alternative P-1 results in slow and steady ice transport past the dam. Alternative P-3 leads to faster ice transport past the dam, due to the steeper gradient. Alternative P-2 provides benefits from the downstream transport of ice fragments. However, ice accumulation may occur at Knolls contraction when ice discharge exceeds the ice transport capacity. In addition, P-2 and P-3 will likely result in an unfavorable draw-down of water levels at Dam D.

As indicated, the evaluation of the three mitigation alternatives is based on the January 2018 breakup event. Variable factors and conditions that could occur in a different event may result in a variety of outcomes. The modeling performed has provided an insight into what can be expected to happen under varying conditions, such as river flow, ice thickness, ice breaking, ambient temperatures, and strategic operation of the proposed pneumatic crest gates system.

NYPA utilized the computational modeling performed by Clarkson as input to a risk analysis of alternatives P-1, P-2, and P-3. The analysis considered benefits associated with anticipated upstream flood reduction, varying risks, and challenges during design and construction associated with each option, and operational risks that may exist after construction. After performance and consideration of this analysis and project benefits described in our December 22, 2022, letter, NYPA elected to proceed with the detailed design of alternative P-1. NYPA is currently procuring an Engineer of Record (EOR) to provide detailed design engineering services and anticipates updating the project schedule once the EOR is procured and commences work.

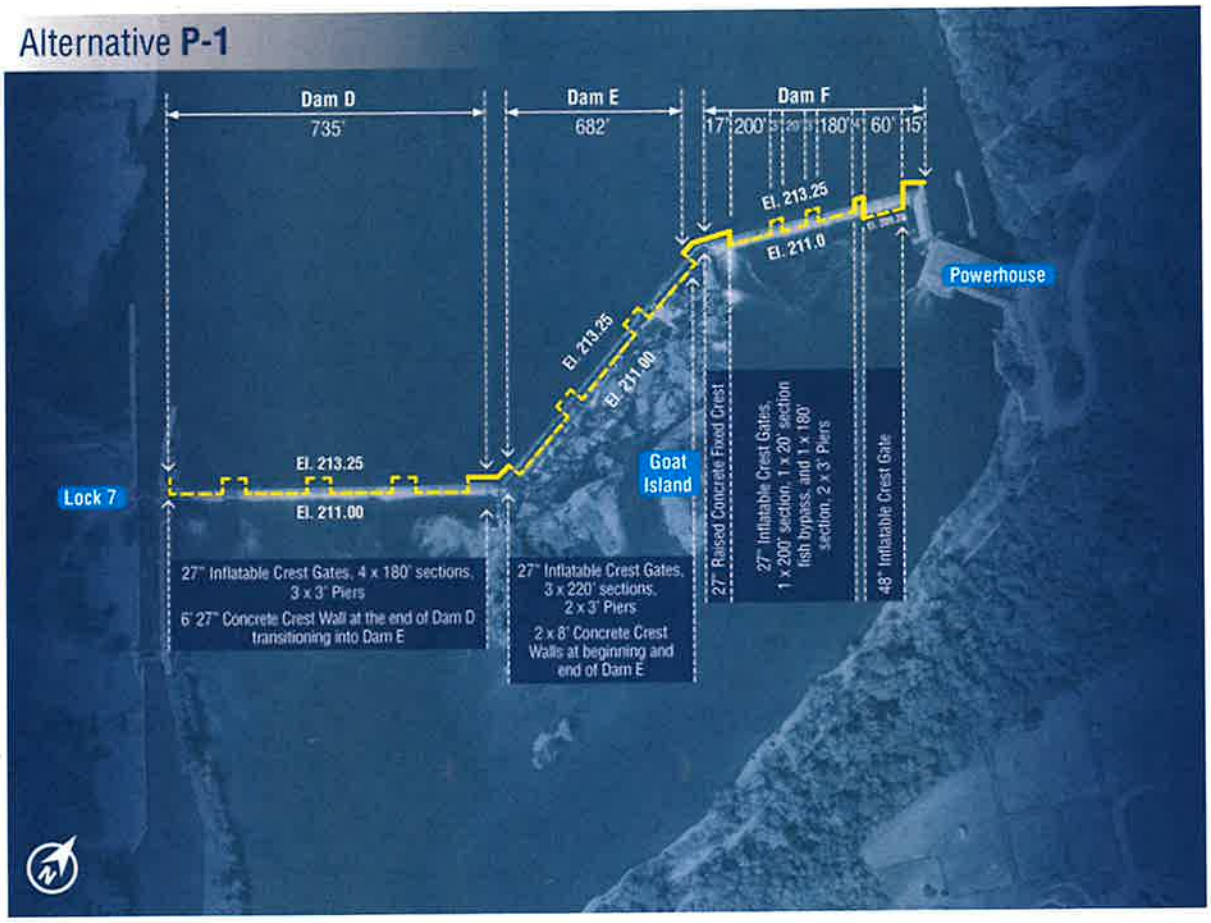
Please contact me if you have any further questions.

Sincerely,

Robert A. Daly
Director, Licensing
New York Power Authority

CC: Joy Kurtz
Margie Noonan

Attachment A



Attachment A: Plan view of proposed crest gate configuration at Vischer Ferry Dam

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Document Content(s)