

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426
July 23, 2009

OFFICE OF ENERGY PROJECTS

Project No. 12704-002-Maine
Half Moon Cove Tidal Power Project
Tidewalker Associates

Mr. Normand Laberge
Tidewalker Associates
46 Place Cove Road
Trescott, ME 04652

Reference: Request for Additional Information and Studies

Dear Mr. Laberge:

After reviewing the Pre-Application Document (PAD) for the proposed Half Moon Cove Tidal Power Project, the staff has determined that additional information on project facilities and operations, geology and soils, water resources, aquatic and terrestrial resources, threatened and endangered species, land use, and aesthetics are needed. The staff has also determined that studies on water quality and quantity, aquatic vegetation, waterfowl, archaeological and historic resources, recreation, and aesthetics are needed.

Please note that staff may require additional studies on aquatic resources depending on your response to the additional information requests. The additional information and study requests are discussed in the enclosed Schedule A and should be addressed in your proposed study plans, to be filed on or before September 6, 2009.

If you have any questions, please contact Steve Kartalia at (202) 502-6131, or via e-mail at Stephen.Kartalia@ferc.gov.

Sincerely,

Ann F. Miles, Director
Division of Hydropower
Licensing

Enclosure: Schedule A
cc: Mailing List, Public Files

ADDITIONAL INFORMATION

Project Maps

1. Section 5.6 of the Commission's regulations requires that the Pre-Application Document (PAD) include: (1) detailed maps showing lands and waters within the project boundary by township, range, and section, as well as by state, county, river, river mile, and closest town, and also showing the specific location of any Federal and tribal lands, and the location of proposed project facilities, including roads, transmission lines, and any other appurtenant facilities; and (2) a detailed description of all existing and proposed project facilities and components including the physical composition, dimensions, and general configuration of any dams, spillways, penstocks, canals, powerhouses, tailraces, and other structures proposed to be included as part of the project or connected directly to it. Figure HMC-01 on page 2-1 does not include all of the information required by the Commission's regulations. Please revise Figure HMC-01 to show the following: a project boundary; any tribal lands; roads; transmission lines; and the physical composition, dimensions, and general configuration of the dam, powerhouse, filling / emptying gates, trashracks and any other appurtenant facilities.

Existing and Proposed Project Facilities

2. Page 2-5 of the PAD shows a cross section of the proposed dam and powerhouse. Based on this cross section, it appears that the bottom elevation of the turbines and draft tubes are proposed to be constructed below the existing ground surface. Please identify the bottom elevation of the turbines and draft tubes, and the extent of the area and volume of material that will need to be excavated for the headrace and tailrace.

3. Pages 2-6 and page 2-7 of the PAD describe two differing proposed modes of operation for the project, and page 2-10 describes two differing project designs. So staff and other participants can effectively evaluate the impacts of the proposed project on the resources of Half Moon Cove and avoid requiring unnecessary studies, please identify a preferred project design and mode of operation.

4. Figures HMC-04 and HMC-05 of the PAD show water surface levels in Half Moon Cove and Cobscook Bay. It is apparent from these figures and as discussed in the PAD, that low tide levels will be affected by the proposed project. However, Figure HMC-05 shows that the water surface levels in Half Moon Cove during high tides will also be affected by the proposed project. For the preferred alternative, please plot the water surface levels in Half Moon Cove and Cobscook Bay for one lunar cycle using the hydraulic characteristics of the proposed turbines and of the proposed filling / emptying gates. One lunar cycle will include a range of tides including spring, average and neap. Also, for the range of tides in Half Moon Cove, please provide a table and/or plot of

water surface elevation, storage capacity and impoundment area. Finally, please quantify the “slight volume of permanent storage” and “slight reduction of water transfer across Half Moon Cove” described on page 3-11. This information will allow Commission staff to gain an understanding of potential project effects on the magnitude and duration of tide levels in Half Moon Cove.

Project Operation and Maintenance

5. Page 3-7 of the PAD states that potential impacts from storm surges (e.g., slope erosion) will be beneficial to certain sections of Half Moon Cove. The meaning of this statement is unclear. Are the benefits to Half Moon Cove with or without the proposed project? Please describe how the project will be operated during storm surges and how the project would provide benefits during storm surges.
6. Please describe the following:
 - a. How the proposed turbines would be protected from fouling by debris and any plans to manage the debris that collects at the turbines and dam.
 - b. How the project would be operated to accommodate ice floes.
 - c. When the turbines are off-line, how flow would enter and exit Half Moon Cove, and would water surface elevations in the cove change from the on-line condition?

Project Construction

7. Page 2-11 of the PAD states that an estimated 100,000 cubic yards of concrete would be required to construct the proposed powerhouse, which would be integral with the dam. This amount of concrete will likely require a ready-mix concrete plant to be located at the project site. Page 3-10 also lists estimates of materials needed to construct the project, including a different estimate for concrete than the one given on page 2-11. Please clarify which estimates are correct and describe any land use impacts that would result from installation, operation, and removal of a ready-mix concrete plant. Also, please identify where the construction lay-down area is proposed to be located.

Geology and Soils

8. Section 4 of the PAD describes the geology and soils of the project area. Page 4-1 states that soils information will be submitted to comply with Section 5.6(d)(3)(ii) of the Commission’s regulations. Please submit this information within 30 days.
9. Figures HMC-10, 13, 14, 15, 16, 17 and 18 in the PAD are not legible. Please provide legible copies at a scale that clearly displays the data.

Schedule A

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10. Please provide a description of, and the data that was developed for, the historic explorations that are presented in Figure HMC-10.

11. Page 4-11 of the PAD states that operation of the proposed dam will not impact the stability of the soils around Half Moon Cove. Please provide the methodology, data sources, and copies of any computer models that were used to determine that operation of the proposed project will not have an impact on the stability of the shoreline of Half Moon Cove.

Water Resources

12. Section 5.6 of the Commission's regulations requires that the PAD include the drainage area at the project site. Please provide the total land area that drains to Half Moon Cove, delineated at the proposed location of the dam. Although the flow from this area may not affect the volume available for power generation, the freshwater input may effect the environment of Half Moon Cove, especially salinity during low tide.

13. Page 15-2 of the PAD states that there are no dams in the basin. However, Page 2-14 describes the construction of two dams on both sides of Carlow Island along the eastern side of the proposed project. Please provide a description of these dams.

14. Page 5-3 of the PAD states that the flow duration curve is not a relative function for a tidal power plant. It is unclear, then, how the project's dependable capacity was determined? Please provide the data and the assumptions used to determine the project's dependable capacity. Indicate the period of record and the location of the tide gage(s), including gage identification number(s).

15. Section 5.6(d)(3)(iii)(H) of the Commission's regulations requires the surface area, volume, maximum depth, flushing rate, shoreline length, and substrate composition of any existing or proposed reservoir. Page 5-13 states that this is not applicable. Please provide the rationale as to why this section of the Commission's regulations is not applicable. It is our understanding that the proposed dam will impound the waters of Half Moon Cove, which will act as a reservoir. Therefore, for Half Moon Cove, please provide these data for mean high tide, mean tide, and mean low tide.

16. Page 5-8 of the PAD summarizes the results of salinity and turbidity monitoring conducted in Half Moon Cove in 2006. Please provide the complete report from this monitoring effort.

Aquatic Resources

17. In Section 6 of the PAD, numerous studies are cited in the sections describing the aquatic biota of the project area, including algae, shellfish and other invertebrates, fish, sea turtles, and marine mammals. Summary tables are provided as well as text

summarizing the results of various field surveys. However, many of the figures and tables cited in the text are not provided. So we can determine whether existing information on the project area's aquatic biota and essential fish habitat is adequate for an analysis of potential effects, we need to review the entire reports which you cite. Please make these reports available either by making and distributing CDs, posting the full reports on your website in a downloadable format, or filing the reports with the Commission. If the study reports can not be provided, or if we determine that existing information is not adequate to describe the baseline condition of aquatic resources potentially affected, then Tidewalker may be required to conduct field surveys of aquatic biota which occur year-round or seasonally in Half Moon Cove, as well as produce detailed maps of essential fish habitat potentially affected by the project. We will make this determination after reviewing your responses to this information request, the comments and study requests of other stakeholders, and your proposed study plan.

18. In addition to their implications for project operational reliability, trashracks may be necessary to protect fish, seals, sea turtles, whales, porpoises, and other aquatic biota from potential injury or mortality due to turbine entrainment. Therefore, please provide the design specifications of the proposed trashracks, including dimensions, clear spacing between bars, and an estimate of maximum through-rack water velocity on both the incoming and outgoing tides. If you are not proposing trashracks, then please explain how you propose to protect fish and other aquatic biota from injury and mortality due to turbine entrainment.

Terrestrial Resources

19. On page 2-15 of the PAD you indicate that a new transmission line corridor will be constructed from Half Moon Cove to Pembroke, but on page 7-1 you state that the transmission corridor will occur along an existing transmission corridor and will not create impacts to wildlife or botanical resources. Please clarify if the transmission line corridor will be constructed or if it already exists.

20. Section 5.6(d)(3)(v) of the Commission's regulations requires that the PAD include a description of wildlife and botanical resources, including invasive species, in the project vicinity, including the project's transmission line corridor. Please provide a description of wildlife and vegetation resources located along the corridor.

21. Section 5.6(d)(3)(vi) of the Commission's regulations requires that the PAD include a description of wetlands, riparian, and littoral habitat, including a list of plant and animal species that use these habitats, a map delineating the wetlands, riparian, and littoral habitats, and estimates of acreage for each type of wetland, riparian, and littoral habitat, including variability as a function of storage (change in natural water level regime). Please provide the required information pertaining to wetland, riparian, and littoral habit in the project area.

22. On page 3-17 of the PAD you state, “since the bird community generally feeds along the upper reaches of the tidal spectrum as the tide recedes, the impacts on the bird-feeding habitat are not deemed significant...” Please provide data to support this conclusion.

Threatened and Endangered Species

23. Page 9-5 of the PAD describes the roseate tern, but does not describe the preferred habitat of the bird. Please provide a description of the preferred habitat of the roseate tern and whether this habitat is present in the project area.

Land Use

24. Section 4.41(h)(3) of the Commission’s regulations requires Exhibit G to show any public lands and reservations of the United States that are within the project boundary, including Indian tribal lands. The PAD cites the Pleasant Point Reservation of the Passamaquoddy Tribe as an affected community bordering the northeastern segment of Half-Moon Cove, and Figure HMC-01 shows the general location of the Pleasant Point Reservation in relation to the proposed project area. However, the specific location and relative size of these lands are not clearly identified. Please show this information on the Exhibit G drawings. Additionally, Section 4.41(h)(4) of the Commission’s regulations requires Exhibit G to show (i) lands owned in fee by the applicant and lands that the applicant plans to acquire in fee; and (ii) lands over which the applicant has acquired or plans to acquire rights to occupancy and use other than fee title, including rights acquired or to be acquired by easement or lease. Section 5.6(d)(3)(viii)(J) of the PAD cites there is potential for the project area to involve Tree Growth or Open Space designations, managed under State of Maine guidance. However, the locations of these lands are not identified. Please identify land property ownership and provide this information on the Exhibit G drawings. This information should include the quantified amount of land (in acreage) that will be inundated by the variance in tidal ranges for all proposed modes of operation and design.

Resource Management Plans

25. Section 5.6 of the Commission’s regulations requires that the PAD include a list of relevant Federal, state, and tribal plans pertaining to waterways and resource management. Page 16-4 states that the proposed project does not seem to have any conflicts with existing management plans. Please provide a list of the existing management plans that were reviewed in preparing the PAD along with citations.

STUDY REQUESTS

After reviewing the PAD, we have identified a gap between the information in the PAD and the information needed to assess project effects. As required in section 5.9 of the Commission's regulations we have addressed the seven study request criteria for each of the study requests that follow.

Water Quality and Modeling Study

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to characterize water quality within Half Moon Cove for use in numeric modeling. The objective of this study is to document existing water quality conditions in Half Moon Cove and subsequently model water quality under a variety of meteorological and lunar conditions and seasons after project construction. The study plan should be developed in consultation with the Passamaquoddy Tribe, Maine Department of Game and Inland Fisheries, and Maine Department of Environmental Protection.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Construction and operation of the project may affect habitat for aquatic resources in Half Moon Cove.

Criterion (4) – Describe existing information concerning the subject of the study proposal and the need for additional information.

The PAD describes Half Moon Cove as a small tidal cove with a surface area of 1.27 miles located in the northern part of Cobscook Bay, Maine. The area is best described as an estuary with extreme tidal range (12-26 feet). Environmental resources include a diverse resident cool water ground fishery, nursery habitat for finfish and shell fish and feeding grounds for marine mammals and migratory waterfowl.

The PAD cites results of water quality studies performed in Half Moon Cove in 1977 and 2006. The 2006 data only briefly summarized salinity and turbidity in Half Moon Cove and the majority of the data summarized in the PAD was for Cobscook Bay/Western passage. More recent water quality data (temperature, pH, dissolved oxygen, salinity, turbidity and nutrients) within Half Moon Cove is needed because water quality conditions in Half Moon Cove have changed since the relocation of the Quoddy Village Waste Water Treatment Plant (WWTP) outside Half Moon Cove in 1990. Prior to 1990, the Quoddy Village WWTP discharged directly to Half Moon Cove and this effluent negatively impacted water quality in Half Moon Cove. Additional data are required to characterize existing conditions within Half Moon Cove and to model the effects of project construction and operation on temperature, DO and other water quality parameters.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The PAD describes two options for the design of the tidal barrage, a wall and a rock-filled dam and multiple modes of operation for the project. Proposed modes of project operation include pumping to maintain current tidal range, no pumping with reduced tidal range and breaching of the causeway between Pleasant Point and Carlow Island to allow tidal exchange between Half Moon Cove and Passamaquoddy Bay. All of these options will have an impact on water quality in Half Moon Cove and on habitat for fish, shellfish and macroinvertebrates. The results of a comprehensive water quality study with modeling would therefore inform a decision on the direct effects of project construction and operation. In addition, results of the water quality and modeling study would be used in the development of preferred alternatives for project construction, and potential operation and monitoring requirements for the protection of water quality in Half Moon Cove.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The most common method for providing water quality data would be a field study to collect water quality profiles along transects of the Cove. The proposed method involves collection of water quality parameters (dissolved oxygen, temperature, pH, and salinity) at equally spaced intervals in both horizontal (Cove head and Cove exit) and vertical (water column) dimensions of the Cove during flood and ebb tides. Water quality parameters should be collected at various times during the day under various

meteorological conditions to assess temporal variations on water quality. As part of the study, nutrients, metals and organics should also be monitored within Half Moon Cove. The results of the water quality study should then be modeled with an appropriate numeric estuary model that takes into account project design, proposed modes of operation, and causeway breaching to fully evaluate the impacts of proposed project on water quality in Half Moon Cove.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

One field season should be necessary to perform the study with two months of data analysis, modeling, and report writing. It is expected that several data transects across Half Moon Cove would be necessary to fully characterize the Half Moon Cove water quality. Total study cost and effort would depend on the number of transects and frequency of monitoring. The estimated cost to perform the Water Quality Study would be \$50,000 to 75,000.

Water Quantity and Flow Study

Criterion (1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to characterize incoming freshwater flow and tidal flow within Half Moon Cove and to assess the impacts of the proposed tidal barrage on the flushing rate, tidal discharge pattern and tidal range. The objective of this study is to first document tidal range and existing flow contributions in Half Moon Cove and subsequently model flow, tidal range and sedimentation potential under the proposed modes of project operation and design. The study plan should be developed in consultation with the Passamaquoddy Tribe, Maine Department of Game and Inland Fisheries, and Maine Department of Environmental Protection.

Criterion (2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental,

recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Construction and operation of the project, will affect habitat for aquatic resources in the Half Moon Cove.

Criterion (4) – Describe existing information concerning the subject of the study proposal and the need for additional information.

The PAD documents the existing tidal range and tidal flow in Half Moon Cove and states that tidal range will be impacted by the project. The degree of impact is dependent on the mode of operation and project design. The project proposes two modes of operation, operating the project with a 10-foot hydraulic head resulting in a reduction of tidal range from 18 feet to 7 feet or operating the project with 5 feet of hydraulic head to allow for greater drawdown to maintain current tidal range. Design options to be studied include breaching of the causeway to provide additional tidal flushing and no breach of the causeway. The impacts of all modes of operation along with the causeway breach option require study and subsequent modeling for staff to determine the environmental impact of the proposed design and operation.

The PAD cites the results a Section 203 study conducted by the ACOE in 2005 which identified habitat degradation and habitat isolation from the construction of the causeway at the head of Half Moon Cove which cut off tidal exchange between Half Moon Cove and Passamaquoddy Bay. The proposed Half Moon tidal project also has the potential to reduce or modify tidal range which can directly affect the habitat for the diverse aquatic resources in Half Moon Cove.

Criterion (5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The multiple modes of operation and project design will have varying impacts on the aquatic environment. The loss of tidal range would decrease the intertidal habitat and aquatic resources. Breaching of the causeway also has the potential to modify the discharge pattern for incoming freshwater, which has the potential to increase salinity and sedimentation in Half Moon Cove. The results of this study and modeling would inform a decision on required tidal range, flow and measures for the protection of essential aquatic resources for license articles.

Criterion (6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

All freshwater input and tidal flow to Half Moon Cove needs to be quantified to document existing conditions in the Cove. Freshwater input can be quantified by installing a flow gauge at a representative point on the freshwater stream(s) prior to entering the Cove. A bathymetric survey would also be required to document the existing conditions within Half Moon Cove. The bathymetric survey results with quantified flow can be used in a numeric 2D or 3D hydrodynamic model to determine which mode of operation and design that would offer the least impact on aquatic resources of Half Moon Cove. The model should also include potential effects on flow from the possible breach of the causeway.

Criterion (7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

One field season should be sufficient to perform the study and modeling with a month or two of data analysis and report writing. Total study cost would depend on the amount of data required to run the model. The estimated cost to perform the Water Quantity and Flow Study with modeling would be \$45,000 to 65,000.

Submerged Aquatic Vegetation and Algae Study

Criterion (1) Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to determine the effects of the proposed increase in low tide level and increased subtidal area on submerged aquatic vegetation (SAV) and algae in Half Moon Cove. The study should be developed in consultation with the U.S. Fish & Wildlife Service and Maine Department of Inland Fisheries and Wildlife.

The survey and subsequent report should satisfy these specific study objectives:

- Map existing SAV and algae beds in the cove;
- Evaluate the potential for effects on existing SAV and algae with increased water levels (i.e., potential decreased light penetration, etc.)

Criterion (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Criterion (4) Describe existing information concerning the subject of the study proposal and the need for additional information.

The PAD mentions Rockweed as an important intertidal algae species and that Half Moon Cove has abundant algae taxa. The PAD does not mention the presence or absence of SAV, such as eel grass, in the project area. The PAD does not describe the SAV or algae beds in the project area and the effects of the increased subtidal area on these beds.

Criterion (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study would inform the development of license requirements.

The PAD indicates there will be an undetermined loss of intertidal land converted to subtidal lands. The decreased intertidal zone may affect SAV and algae beds. A study that quantifies the amount of SAV and algae that could be affected by the increased water level would facilitate decisions on any needed mitigation for project effects.

Criterion (6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the duration) is consistent with generally accepted practice in the professional design community or, as appropriate, considers any known tribal values or knowledge.

The study should accurately describe and map the quantity of SAV and algae beds present in Half Moon Cove and how the proposed loss of intertidal habitat will affect these beds. The location and quantified area of SAV and algae beds should be depicted on a map at a legible scale. Sufficient transects should be surveyed to document the composition of representative habitat types within Half Moon Cove.

Criterion (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The study would likely take one study season to complete. The cost is estimated to be between \$15,000 and \$30,000, depending on the intensity of the surveys.

Waterbird and Waterfowl Study

Criterion (1) Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to determine the effects of the proposed increase in low tide level and loss of intertidal area on waterbirds and waterfowl. The study should be developed in consultation with the U.S. Fish & Wildlife Service and Maine Department of Inland Fisheries and Wildlife.

The survey and subsequent report should satisfy these specific study objectives:

- Quantify waterbird and waterfowl use of the project area, (i.e., bird counts, carrying capacity, etc.);
- Evaluate the potential for effects on waterbirds and waterfowl from loss of intertidal areas, which provide food sources for the birds

Criterion (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Criterion (4) Describe existing information concerning the subject of the study proposal and the need for additional information.

The PAD indicates that the U.S. Fish and Wildlife Service has designated Half Moon Cove as an important shorebird feeding area. The PAD is inconsistent on the amount of intertidal area to be lost with estimates that range from 140 to 381 acres (23-75% of existing intertidal area). The PAD also provides Audubon Christmas Bird Count (CBC) data to establish the waterbird and waterfowl use of the area. However, CBC data

is collected once annually and does not encompass the entire seasonal use of an area by waterbirds and waterfowl, nor does it determine if an area is at carrying capacity.

Criterion (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study would inform the development of license requirements.

The PAD indicates there will be an undetermined loss of intertidal land converted to subtidal lands. The loss of intertidal lands may affect waterbird and waterfowl use of the project area due to decreased food sources, which could decrease the carrying capacity of the project area and displace waterbird and waterfowl populations. The PAD indicates that these birds could go elsewhere, but no information is provided that indicates surrounding habitats provide the same resources and can support an increased bird population. A study that quantifies the loss of intertidal habitat in Half Moon Cove, the availability of habitat in neighboring sites, and waterbird and waterfowl use of the project area would help inform staff to evaluate the proposed project effects on the local environment.

Criterion (6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the duration) is consistent with generally accepted practice in the professional design community or, as appropriate, considers any known tribal values or knowledge.

The study should accurately describe the quantity of intertidal habitat that will be converted to subtidal habitat. A survey of both the fall and spring migration and nesting period of waterbirds and waterfowl should be conducted to determine the number of birds that use the project area and if the project area is at carrying capacity. This study could be completed in a one-year period to address the different seasons and waterbird and waterfowl life stages.

Criterion (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The study would likely take one study season to complete. The cost is estimated to be between \$10,000 and \$25,000, depending on the intensity of the surveys.

Archeological and Historic Resource Survey

Criterion (1) Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to determine the effects of project construction, operation and any potential mitigation measures on archeological and historic resources. The study should be developed in consultation with the Maine State Historic Preservation Officer (SHPO), the Passamaquoddy Tribe, and other interested parties.

The study and subsequent report should satisfy the following specific study objectives:

- recommend an appropriate area of potential effects (APE);¹
- identify known resources through available literature;
- identify locations that have the potential to contain archaeological resources;
- locate any archeological sites that may exist in areas exhibiting effects from project operation and in areas where ground-disturbing enhancements are proposed;
- assess the National Register of Historic Places eligibility of projects facilities and other historic resources within the APE, including considering whether they may contribute to a larger district;
- evaluate the potential for effects on historic and archaeological resources from operation of the project or from project-related enhancements; and
- prepare a draft historic properties management plan (HPMP) to be filed with the initial study report.

Criterion (2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

¹ A project's area of potential effects (APE) is tentatively defined as the lands enclosed by the project's boundary as delineated in the PAD for the project, and lands or properties outside the project's boundaries where project operation or project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. The continued operation of the project, with any proposed changes or enhancements, may affect the value and integrity of cultural resources in the vicinity of the project.

Criterion (4) Describe existing information concerning the subject of the study proposal and the need for additional information.

No comprehensive, professional cultural resources survey has been conducted of the project's area. There may be unknown historic properties or archeological sites surrounding the impoundment or downstream of the project that may be affected by project operation. Due to the possibility of additional historic properties or archeological sites, a survey of the project's APE is needed. Once known sites in the APE have been documented, potentially eligible historic properties, and any project effects upon them, should be identified.

Criterion (5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study would inform the development of license requirements.

Section 106 of the National Historic Preservation Act of the NHPA (section 106) requires that federal agencies, licensees, and those receiving federal assistance take into account the effect of proposed undertakings on any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (Historic Properties). Constructing, operating, and maintaining the project (such as impoundment fluctuations) could affect known or unknown Historic Properties

The survey would provide information on historic and archeological sites located within the APE. The subsequent report would provide information on which sites are potentially eligible for the National Register and any potential effects of the project on these sites. If there would be an adverse effect on Historic Properties, an applicant-prepared HPMP, developed in consultation with the Commission, the SHPO, and other interested parties, would likely be necessary to avoid or mitigate effects. Exelon should file the final HPMP with the license application. The implementation of the HPMP could then be required in any new license.

Criterion (6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field seasons(s) and the duration) is consistent with generally

accepted practice in the professional design community or, as appropriate, considers any known tribal values or knowledge.

The generally accepted practice is to conduct a literature review and field reconnaissance; depending on the results, a more intensive field survey may be necessary. Prior to conducting the survey and report, Tidewalker Associates should consult with the SHPO on: (a) the delineation of the APE; (b) methods on how the survey should be conducted; (c) anticipated effects on cultural resources; and (d) what properties are and are not considered eligible for the National Register.

The Cultural Resources Report should include all the information necessary to satisfy the objectives listed under *Criterion (1)*. The evaluation of project effects on cultural resources should include both site-specific effects (i.e., project operation and maintenance, erosion, vehicular traffic, etc.) and all potential future effects (i.e., new recreational facilities, etc.).

Criterion (7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The study would likely take one study season to complete. The cost is estimated to be between \$8,000 and \$25,000 per project, depending on the intensity of the surveys.

Recreation Study

Criterion (1)—Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to assess the effects of the project on boat access including an evaluation of the feasibility of the two proposed types of boat ramp provisions. The study's objectives are to (1) identify potential hazards to recreational users from the construction and operation of the proposed project, (2) specify the range of public boat access to be permitted, and (3) determine appropriate navigational aids necessary to ensure safe boat passage within the area of the proposed project. The study should include an assessment of each ramp type under consideration, in junction with all proposed modes of operation, design, and construction.

Criterion (2)—If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3)—If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Section 2.7 of the Commission's regulations states that the Commission will evaluate the recreational resources of all projects under federal license or applications therefore and seek, within its authority, the ultimate development of these resources, consistent with the needs of the area to the extent that such development is not inconsistent with the primary purpose of the project. In addition, sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Criterion (4)—Describe existing information concerning the subject of the study proposal and the need for additional information.

Section 5.6(d)(3)(viii)(A) of the PAD indicates that the area around Half-Moon Cove does not include any existing recreational facilities, but states that provisions will be made for recreational boat traffic by placing boat ramps on both sides of the dam at an acceptable distance to ensure safe passage. The PAD, however, does not include any specifications on the placement and size of these ramps, as well as information on the vessel size and type of boat access to be permitted in each scenario. Further, Section 5.6(d)(3)(i)(C) states that the construction of the dam will present an obstruction to navigation which will need to be mitigated through consultation with both the United States Coast Guard and the Army Corps of Engineers after determining the degree of navigational interference. The PAD, however, does not provide sufficient record of project specific consultation with either the Coast Guard or the Corps, nor any mitigation measures under consideration for each proposed mode of operation and design. Therefore, staff needs information sufficient to evaluate the adequacy of the proposed provisions made for both recreational boat traffic and navigational aids.

Criterion (5)—Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The proposed project will alter the area in and around Half-Moon Cove, including areas of recreational access and the navigational safety of the surrounding waters. The study would provide necessary information to determine adequate provisions for both recreational boat access and navigational aids to mitigate alterations made to Half-Moon Cove from the proposed project.

Criterion (6)—Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with

generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Several types or combinations of methodologies are possible in assessing the feasibility of strategies to mitigate recreational access and navigation. Some methods include literature research, desktop analysis, field reconnaissance, recreation surveys, or some combination of these approaches, each of which have been used successfully in hydroelectric project licensing cases. Detailed explanation of the criteria to be used to judge the adequacy each type of boat ramp and navigational aid must be clearly outlined. Specific methodologies and scope can be refined during a study plan meeting(s).

Criterion (7)—Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

Staff estimates the study would cost about \$30,000-\$50,000. As stated above, total costs and efforts would depend on the decided design and mode of operation, as well as the specific methodology chosen.

Aesthetics Study

Criterion (1)—Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to assess the aesthetic effects of construction and operation of the project. The study's objectives should include (1) assessing the visual aesthetic effects of both construction and operation, including the effects of lighting at night, and (2) evaluating the effects of noise and other disturbances generated during construction and operation on the surrounding area. The assessment should also propose mitigation approaches to screen or minimize any unwanted impacts.

Criterion (2)—If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resources to be studied.

Not applicable.

Criterion (3)—If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the Federal Power Act require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental,

recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Aesthetic impacts during construction and project operation, including lighting at night, may affect residences in the surrounding area, as well as affect public use and enjoyment of the area.

Criterion (4)—Describe existing information concerning the subject of the study proposal and the need for additional information.

The PAD cites in section 5.6(d)(3)(ix) that the impacts on the aesthetic character of Half-Moon Cove are focused at the entrance to the tidal basin. In addition, the section includes a schematic view of the powerhouse with a rockfill dam design. The PAD, however, does not indicate any consideration of potential aesthetic impacts to the surrounding area, nor any measures to limit visual and/or noise-related impacts during construction and project operation.

Criterion (5)—Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Construction of the proposed project will entail an increase in construction-related activity in and around Half-Moon Cove for some period of time, including the presence of temporary structures and increased traffic from both normal and heavy equipment. Further, construction bears the potential for increased noise, vibrations, disruptive lighting, and debris. Following construction, the proposed project structures and facilities, and their operation, will alter the visual qualities of Half-Moon Cove depending on the decided mode of operation and design, as well as whether or not the causeway is breached. An aesthetic impact study would provide necessary information to assess the effects on aesthetic resources during both construction and operation of the proposed project.

Criterion (6)—Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

Several types or combinations of methodologies are possible in assessing the visual and audio impacts of construction and project operation at Half-Moon Cove. Some methods could include literature review, field reconnaissance to determine predicted levels via modeling, field surveys to compare proposed decibel levels around substantial residential areas, or some combination of these approaches, each of which have been used successfully in hydroelectric project licensing cases. Detailed

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explanation of the criteria to be used to judge both visual and noise-related impact from construction and project operation must be clearly outlined. Specific methodologies and scope can be refined during a study plan meeting(s).

Criterion (7)—Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

Staff estimates the study to take between four and six months to complete, and the cost to be between \$20,000 and \$40,000. As stated above, total costs and efforts would depend on the decided design and mode of operation, as well as the specific methodology chosen.

Document Content(s)

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