STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF: CENTRAL MAINE POWER COMPANY 25 Municipalities, 13 Townships/Plantations, 7 Counties L-27625-26-A-N L-27625-TB-B-N L-27625-2C-C-N L-27625-VP-D-N L-27625-IW-E-N CENTRAL MAINE POWER COMPANY NEW ENGLAND CLEAN ENERGY CONNECT SITE LAW CERTIFICATION SLC-9	)))))))))))))	APPLICATION FOR SITE LOCATION OF DEVELOPMENT ACT PERMIT AND NATURAL RESOURCES PROTECTION ACT PERMIT FOR THE NEW ENGLAND CLEAN ENERGY CONNECT

POST-HEARING BRIEF OF INTERVENOR GROUP 3

1. INTRODUCTION

A. Overview

Voltaire famously said, “the best is the enemy of the good.” Similar sage advice is attributed to Confucius (“[b]etter a diamond with a flaw than a pebble without”) and Shakespeare (“[s]triving to better, oft we mar what’s well”). This maxim is commonly re-phrased today as: “don’t let the the perfect be the enemy of the good.” These proceedings test the extent to which the applicable statutes, regulations, and legal precedent embody this sound guidance, or whether, as opponents of the New England Clean Energy Connect project (“NECEC” or “Project”) argue, the established legal framework should be reinterpreted to shirk this wisdom and find that no project of a similar scope and nature, regardless of its benefits, can be approved unless it is virtually perfect.

Intervenor Group 3 ("Group 3"), consisting of (1) Industrial Energy Consumer Group; (2) the City of Lewiston; (3) International Brotherhood of Electrical Workers, Local 104; (4) the Maine State Chamber of Commerce; and (5) the Lewiston/Auburn Chamber of Commerce, intervened in these proceedings[1] to counteract the forces that would employ the ideal of "perfection" to defeat or delay essential energy infrastructure, found by the Maine Public Utilities Commission ("MPUC") to be in the "public interest,"[2] but which may in some small way impair private interests. Recognizing that NECEC, or any similar project, would obviously create some adverse impacts, Group 3's members sought to elucidate the Project's immense energy and economic benefits—benefits that must be balanced against adverse impacts to determine if such impacts are unreasonable. Group 3's direct testimony, stricken[3] and subsequently re-filed as public comments, provides ample proof that NECEC's benefits far outweigh its environmental impacts.[4]

Opponents raise a variety of concerns, which fairly can be characterized as ranging from "the proposal is not perfect" to "NECEC is the death knell for Maine as we know it," conjuring images of the New Jersey Turnpike to raise fear. Beyond hyperbole, opponents consistently mischaracterize applicable legal standards, particularly the requirement to analyze practicable alternatives. Ironically, one of the most vocal opponents to do so, NextEra Energy Resources ("NextEra"), sought (and presumably still hopes) to use the same corridor for construction of an overhead transmission line to carry the output of solar and wind projects it is developing. If opponents' arguments are accepted, however, the cost to develop projects like NextEra's may

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[1] Lewiston/Auburn Chamber of Commerce is an intervenor in the Land Use Planning Commission proceeding only and does not take part in the portions of this brief pertaining to matters of sole Department of Environmental Protection jurisdiction.
[2] *See generally*, *Central Maine Power Company*, Request for Approval of CPCN for the New England Clean Energy Connect Consisting of the Construction of a 1,200 MW HVDC Transmission Line from the Québec-Maine Border to Lewiston (NECEC) and Related Network Upgrades, No. 2017-00232, Order Granting Certificate of Public Convenience and Necessity and Approving Stipulation (Me. P.U.C. May 3, 2019).
[3] Dep't of Env't Prot. & Land Use Planning Comm'n, Fifth Procedural Order ¶ 6.
[4] See generally, Group 3 Public Comments (Mar. 21, 2019).

increase so dramatically that they would become financially unviable, reducing or eliminating the potential for renewables in Maine to assist Maine and other New England states in achieving their environmental and climate change goals. Projects other than NECEC absolutely will be necessary to achieve these goals.[5] If "perfect" becomes the enemy of the "good" today, even the "good" will be harder to achieve tomorrow.

This brief will define the legal standards applicable to NECEC and describe how the overwhelming weight of the evidence presented clearly demonstrates that the Project satisfies all applicable legal requirements. Group 3 urges the Department of Environmental Protection ("DEP") and Land Use Planning Commission ("LUPC") to reject calls by Project opponents to reinterpret these standards to require "perfection" and, instead, to approve NECEC with appropriate conditions.

B. Project Description

NECEC is a high-voltage, direct current ("HVDC") transmission line capable of delivering up to 1,200 megawatts ("MW") of renewable reservoir hydropower electricity from the Canadian border to the ISO-New England ("ISO-NE") electric grid in Lewiston, Maine.[6] NECEC was proposed by Central Maine Power Company ("CMP") in response to the March 31, 2017, Massachusetts Clean Energy Request for Proposals ("RFP") and was subsequently selected the winner.[7] By choosing NECEC, Massachusetts has determined that the Project will provide 9,450,000 MWh of "firm, guaranteed, and tracked year-round energy deliveries," through cost-effective long-term contracts, that "will reduce winter electricity price spikes, improve system reliability and resiliency, and provide renewable energy certificates."[8]

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[5] The Maine Legislature is about to enact LD 1494, "An Act To Reform Maine's Renewable Portfolio Standard," which, *inter alia*, establishes goals of 80% of all Maine electricity sales by 2030 and 100% by 2050 coming from renewable energy sources.
[6] Feb. 28, 2019 Pre-filed Direct Test. of Thorn Dickinson (CMP) at 2–3; Ex. CMP-1-D; Ex. CMP-1-E.
[7] Feb. 28, 2019 Pre-filed Direct Test. of Thorn Dickinson (CMP) at 2–3.
[8] *Id.* at 3–4.

The Project fully satisfies the statutory criteria for a Natural Resources Protection Act ("NRPA") permit pursuant to 38 M.R.S. §§ 480-A – 480-JJ and a Site Location of Development Act ("Site Law") permit pursuant to 38 M.R.S. §§ 481–90. Under NRPA § 480-D, the DEP "shall grant a permit when it finds . . . the proposed activity meets the standards set forth in subsections 1 to 11."[9] Under the Site Law § 484, the DEP "shall approve a development proposal whenever it finds"[10] that ten criteria have been met. The DEP narrowed the scope of its hearing to four of the "most significant and contentious"[11] topics.[12] While CMP has demonstrated compliance with all the standards and criteria under the NRPA and Site Law, Group 3 confines its initial DEP brief to the alternatives analysis.

NECEC crosses three separate LUPC Recreation Protection ("P-RR") subdistricts: generally, (1) the site of the proposed Kennebec River crossing; (2) near Beattie Pond; and (3) at the Appalachian Trail crossing of the Project corridor.[13] Within a P-RR subdistrict, a utility facility is allowed by special exception if the LUPC finds that an applicant has shown by substantial evidence that (a) there is no alternative site which is both suitable to the proposed use and reasonably available to the applicant; (b) the use can be buffered from those other uses and resources within the subdistrict with which it is incompatible; and (c) such other conditions are met that the LUPC may reasonably impose in accordance with the policies of the Comprehensive Land Use Plan.[14] The LUPC must certify to the DEP (a) whether NECEC is an allowed use within the relevant P-RR subdistricts and (b) whether NECEC meets any LUPC land use standards that are not duplicative of those considered by the DEP under the Site Law.[15] The LUPC also narrowed

[9] 38 M.R.S. § 480-D (emphasis added).
[10] 38 M.R.S. § 484 (emphasis added).
[11] Dep't of Env't Prot., First Procedural Order ¶ 18.
[12] Dep't of Env't Prot., Second Procedural Order ¶ 7.
[13] Land Use Planning Comm'n, First Procedural Order ¶ 3.
[14] *Land Use Districts and Standards,* 01-672 C.M.R. 10 (Chapter 10), section 10.23,I,3.d.
[15] 12 M.R.S. § 685-B(1-A)(B-1).

the scope of its hearing to focus on buffering and the alternatives analysis.[16] Group 3 will focus its initial LUPC brief on alternatives.

C. Context: The Significant, Unique, and Timely Benefits of NECEC to Maine

As extensively explained in its public comments, Group 3 has advocated for approval of NECEC because of the significant, unique, and timely energy and economic benefits provided to Maine by the Project in comparison to its costs, both financial and environmental.[17] In particular, the Project will lower Maine's electricity costs, enhance grid reliability and "fuel security," and help Maine meet its greenhouse gas reduction goals.

In matters of energy infrastructure, context truly matters. The context in which Maine makes energy infrastructure decisions is the regional grid run by ISO-NE.[18] Maine consumers share in the risks, benefits, and most costs of the regional grid. No state is an island unto itself. Thus, it is important that NECEC was selected through a Massachusetts solicitation process. This selection de facto defines the NECEC's purpose. When new supply is introduced and new transmission interconnections with other regions constructed, Maine experiences price and reliability changes with the rest of the region, whether Maine contractually purchases power delivered in NECEC or not.

The MPUC found that the NECEC would suppress wholesale electricity price by between $14 and $44 million per year, "with estimated [net present value] benefits ranging from $122 to $496 million (2023$)."[19] This a timely and much-needed reprieve from extreme volatility, some of the highest electricity prices in the world, and economic disadvantage suffered by Maine industrials (and other consumers alike) relative to all other regions of the U.S.[20]

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[16] Land Use Planning Comm'n, Second Procedural Order ¶ 5.
[17] Group 3 Public Comments, *supra* note 4.
[18] *Id*., Appendix A, "Pre-filed Direct Testimony of Glenn S. Poole" at 6-7.
[19] MPUC Order, *supra* note 2, at 30.
[20] Group 3 Public Comments, *supra* note 4, Appendix A, "Pre-filed Direct Testimony of Glenn S. Poole" at 14-21.

New England (especially Maine) is extremely reliant on natural gas as a source of fuel for electric generation and industrial use but lacks adequate natural gas pipeline infrastructure to ensure gas availability during much of winter.[21] With respect to Maine electric reliability, the NECEC will deliver firm hydroelectric power into New England during hours when natural gas is unavailable or priced so high that its use is uneconomic.[22]

To address rising concerns about "fuel security," ISO-NE performed the "Operational Fuel-Security Analysis" in January of 2018,[23] examining 23 possible future resource combinations and outage scenarios during winter 2024/2025 to determine whether there would be enough fuel to meet demand.[24] Twenty-two scenarios required some sort of emergency action and/or resulted in reliability criteria violations by ISO-NE.[25] Nineteen scenarios required some level of load shedding, meaning "rolling blackouts or controlled outages that disconnect blocks of customers sequentially."[26] The possibility of rolling brownouts and blackouts has shocked large Maine electricity consumers. Capital investment in manufacturing cannot be sustained where electric reliability is suspect. Electric reliability also is essential in a digital economy, for every consumer.

Notably, ISO-NE found that "[r]obust levels of imported electricity from neighboring power systems are essential to continued power system reliability."[27] It concluded that:

> A resource mix with higher levels of LNG, imports, and renewables shows less system stress than the reference case. These scenarios … result in fewer hours of emergency actions, depletion of reserves, and load shedding. To achieve these levels of LNG, imports, and renewables, firm contracts for LNG delivery, assurances that electricity imports will be delivered in winter, and aggressive development of renewables, including expansion of the transmission system to import more clean energy from neighboring systems, would be required.[28]

[21] *Id*.
[22] *Id*. at 29-31.
[23] *Id*. at 22.
[24] *Id*.
[25] *Id*.
[26] *Id*. (emphasis added).
[27] *Id*. at 23 (citing ISO-NE, "Operational Fuel-Security Analysis" at 51).
[28] *Id*. (citing ISO-NE, "Operational Fuel-Security Analysis" at 54 (emphasis added)).

The phrase "expansion of the transmission system to import more clean energy from neighboring systems" unequivocally means importing more hydropower over the NECEC, and any other line that can be built.

NECEC will also facilitate Maine's and the region's collective effort to reduce greenhouse gas emissions. It will assist Maine in meeting its expanded renewable energy goals by providing Maine for the first time with a direct interconnection to one of the world's largest hydroelectric resources, at no cost to Maine.[29] More immediately, the hydroelectric power delivered over NECEC will primarily displace power generated by natural gas, oil, and coal, thereby reducing the production of greenhouse gases by such generators located throughout New England, including those in Maine.[30]

These are just some of myriad benefits of NECEC that must be weighed in determining the reasonableness of its impacts.

2. <u>DEP ALTERNATIVES ANALYSIS</u>

A. The Legal Standard

DEP Rule Chapters 310, 315, and 335 require an applicant to demonstrate that there is no "practicable alternative to the activity" that "would be less damaging to the environment" or "will have less visual impact."[31] "Practicable" is defined as "[a]vailable and feasible considering cost, existing technology and logistics based on the overall purpose of the project."[32] If practicable alternatives exist, an applicant must provide a report or narrative analyzing whether any is less environmentally damaging and still meets the project purpose.[33] The DEP retains site-specific,

[29] *Id*. at 2.
[30] *Id*. at 29-30.
[31] *See* 06-096 C.M.R. ch. 310, §§ 5(A) and 9(A) (2018); 06-096 C.M.R. ch. 315, § 9 (2003); 06-096 C.M.R. ch. 335, §§ 3(A) and 5(A) (2014).
[32] 06-096 C.M.R. ch. 310, § 3(R) (2018); 06-096 C.M.R. ch. 315, § 5(G) (2003); 06-096 C.M.R. ch. 335, § 2(D).
[33] 06-096 C.M.R. ch. 310, § 9(A) (2018); 06-096 C.M.R. ch. 335, §5(A) (2014).

case-by-case flexibility to require additional information, both initially to determine if an application is complete and subsequently to ensure the standards are met during the review process.[34]

This regime is based on the 1972 federal Clean Water Act wetlands protection framework jointly administered by the Army Corps of Engineers ("Corps") and the Environmental Protection Agency ("EPA"). EPA guidelines contain a nearly identical definition of "practicable."[35] As such, Corps and EPA guidance is instructive, as are federal court rulings related to Corps and EPA practicability decisions.

A recent federal court decision describes the general parameters around practicability as follows:

> For an alternative to be selected under the Corps's CWA regulations, it must be practicable, as defined by 40 C.F.R. § 230.10(a)(2), and it must be less environmentally damaging than all other practicable alternatives. Id. § 230.10(a)(3). Practicability is thus a threshold determination. "[A]n agency need not analyze the environmental consequences of alternatives it has in good faith rejected as **too remote, speculative, or . . . impractical or ineffective**."[36]

In circumscribing what alternatives are practicable, courts have upheld the rejection of proposed

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[34] 06-096 C.M.R. ch. 310, § 9(F) (2018) ("Because of the site-specific nature of activities and potential impacts, more or less information may be required by the department on a case-by-case basis, in order to determine whether the standards are met. If the Project Manager identifies particular information needed to review the project, that information must be included when the application is submitted to the department or the application will not be accepted as complete for processing. Also, additional information may be required by the department during the review process to determine whether the standards are met.")
[35] 40 C.F.R. § 230.10(a)(2) ("[An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.").
[36] *Hillsdale Environmental Loss Prevention, Inc. v. United States Army Corps of Engineers*, 702 F.3d 1156, 1168 (10th Cir. 2012) (alterations in original) (emphasis added) (footnote omitted) (citation omitted).

alternatives based on project purpose,[37] geography,[38] costs,[39] and logistics.[40] Courts also acknowledge that "modifications" to complex projects, like NECEC, are both expected and welcome, especially where modifications are intended to reduce adverse environmental impacts:

> [C]omplex development plans such as Hyundai's are necessarily subject to modification. Unless a modification substantially alters the overall project purpose, the Corps should not be required to reinitiate an alternatives analysis. Furthermore, the need to reinitiate an alternatives analysis is diminished where project modifications have lowered the potential for adverse environmental impact, where that impact is close to what Corps regulations deem "minimal," and where the proposed project is determined to be in compliance with applicable local land use laws. In light of these factors, the Corps did not act arbitrarily or capriciously by not requiring a new alternatives analysis after the elimination of phase III from consideration.[41]

Simply, a project's legitimate purpose and objectives define practicability. Alternatives too remote, speculative, impractical, ineffective, far away, costly, and logistically complex do not pass the "threshold" and need not be analyzed as alternatives. While some initial steps must usually be taken to determine impracticability, they do not entail the extensive testing, analysis, and reporting required of alternatives that do pass the practicability threshold.

Further, the Maine Law Court has held that the existence of a practicable alternative itself is but one factor to balance in the context of assessing overall reasonableness under the NRPA:

> Whether a proposed project's interference with existing uses is reasonable depends on a multiplicity of factors, one of which is the existence of a practicable alternative. A balancing analysis inheres in any reasonableness inquiry. Therefore, the Board's consideration of practicable alternatives to a proposed project is a factor that should be balanced in its section 480-D(1) analysis.[42]

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[37] *See, e.g.*, *Friends of Santa Clara River v. United States Army Corps of Engineers*, 887 F.3d 906, 912 921 (9th Cir. 2018) ("[T]he Corps not only may, but must, consider Newhall Land's project objectives, provided that those project objectives are not so narrowly defined as to preclude alternatives . . . and must also consider the Specific Plan objectives . . . . Therefore, the Corps was not arbitrary or capricious in rejecting certain alternatives on the ground that they failed to meet Newhall Land's objectives or the Specific Plan objectives." (citations omitted)); *Jones v. National Marine Fisheries Service*, 741 F.3d 989, 1002 (9th Cir. 2013) ("Logically, no one would seek financing to build a refining facility if it were not possible to extract a sufficient quantity of minerals to make the project profitable. Accordingly, the Corps did not err in rejecting the individual sites because such sites would not provide a sufficient quantity of chromite to meet the project's purpose." (citation omitted)).

[38] *See, e.g.*, *Stewart v. Potts*, 996 F. Supp. 668, 675–76 (S.D. Tex. 1998) ("Moreover, . . . the Corps has an affirmative duty to accord weight to the objectives of the applicant. Therefore, the Court finds that it was within the Corps' discretion to consider alternatives only within the City of Lake Jackson's extraterritorial jurisdiction." (citation omitted)).

[39] *See, e.g.*, *Friends of Santa Clara River v. United States Army Corps of Engineers*, 887 F.3d 906, 921 (9th Cir. 2017) ("The Corps could reasonably reject Alternatives 7 and 8 because . . . their substantial increase in costs (51 percent and 28 percent, respectively) would render them impracticable.").

[40] *See, e.g.*, *Friends of the Earth v. Hintz*, 800 F.2d 822, 833–34 (9th Cir. 1986) ("Of the four proposed alternative sites, the Corps rationally concluded that . . . two were logistically unfeasible in light of Rayonier's legitimate purposes.").

[41] *Northwest Environmental Defense Center v. Wood*, 947 F. Supp. 1371, 1379–80 (D. Or. 1996) (footnote omitted) (emphasis added).

[42] *Uliano v. Board of Environmental Protection et al.*, 876 A.2d. 16, 19–20 (Me. 2005) (citation omitted) (emphasis added).

The Law Court explained that "the existence of a practicable alternative does not justify the denial of a proposed project if the degree of interference the project will cause to existing uses is insubstantial."[43] While the existence of a practicable alternative coupled with substantial interference supports denial of a project, such an alternative must actually "enable the applicant to accomplish the project's objectives through alternate means."[44] This is a critical distinction in this instance.

Opponents misconstrue the practicable alternatives standard in several unavailing arguments. First, they argue that, because CMP did not initially consider certain alternatives, namely variations on undergrounding, the Project should be rejected outright. CMP and Group 3 each responded with evidence demonstrating that CMP, as a matter of law, did not need to consider undergrounding because undergrounding did not pass the "practicability" threshold. Opponents then argue that the "new" evidence, (offered to refute opponents' rejection thesis), is late or insufficient for an analysis of alternatives. This argument conflates the legal standard applicable when an alternatives analysis is required with the presentation of evidence confirming that no undergrounding alternatives analysis was ever needed. Opponents also argue that CMP's willingness to modify the Project during the permitting process, through tapering and pole adjustments, is evidence that CMP should have considered those modifications as practicable alternatives initially, or that the Project application must be rejected or amended and relitigated for purportedly lacking details about the modifications. This "catch-22" whereby beneficial mitigation becomes the "enemy" reveals that the goal of most NECEC opponents is defeat or delay by any means; they advocate for an absurd regulatory paradigm under which only a "perfect" project,

[43] *Id.* at 20.
[44] *Id.*

after consideration of every conceivable alterative, could be approved.[45] As no project is perfect, the permitting process would become a de facto barrier upon which all proposals would be rejected, a severe form of regulatory sclerosis.

The permitting process should be a means to test evidence, develop creative forms of mitigation, and ensure compliance with substantive environmental standards, while providing a legitimate opportunity for a project to meet its purpose. Upon consideration of in-fact practicable alternatives and practicable mitigation, a project will either meet the substantive environmental standards (on its own accord or with certain conditions) and the Department "shall grant a permit,"[46] or it will be rejected. The concept of practicable alternatives is not premised on "perfect" projects and a regulatory rejection machine; the opposite is true. Though not flawless, the concept works well to improve, refine, and enhance projects, while protecting the environment.

B. The Undergrounding Alternative, Generally in Segment 1

The record clearly establishes that undergrounding NECEC through the Segment 1 right-of-way ("ROW") is neither practicable nor less damaging to the environment. These conclusions were true initially, have been confirmed subsequently, and are unaffected by proposed beneficial modifications to the Project.

CMP properly rejected the no-action alternative as not meeting the Project's purpose.[47] Then CMP reasonably selected a preferred route from three alternatives based on "identifying the closest existing transmission corridor," finding the "optimal route" from Canada to reach it,[48] and "purposely avoid[ing] . . . areas with protected or sensitive natural or cultural resources, and areas

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[45] In fact, the apparent argument of some NECEC opponents is that a project must be perfect initially; if modifications would improve the project, the applicant failed to employ an adequate alternatives analysis.
[46] 38 M.R.S. § 480-D (2011).
[47] Feb. 28, 2019 Pre-filed Direct Test. of Gerry Mirabile (CMP) at 17.
[48] *Id.* at 17.

with high scenic values and sensitivity."[49] Other than the Upper Kennebec River crossing, CMP did not consider undergrounding a practicable alternative. Critically, however, CMP explained that "the various segments of the route have been designed to include site-specific adjustments to utility structure locations, temporary access roads, and substation designs that avoid and minimize potential natural resource impacts to the greatest extent practicable."[50] To comport with federal precedent about modifications to complex projects, this statement should be interpreted broadly such that the examples given are inclusive of any number of "site-specific adjustments" that are environmentally beneficial and practicable, including tapering and adjusted pole heights.

CMP and Group 3 each presented rebuttal evidence that confirmed CMP's initial determination that undergrounding was impracticable and would not be less environmentally damaging. Mr. Bardwell explained that "[i]t was so clear that undergrounding would not meet the Project purpose or otherwise be practicable, suitable, or reasonably available, in fact, that CMP did not initially include it as an alternative in the application materials"[51] Mr. Paquette confirmed this "obvious"[52] conclusion:

> CMP was correct in not initially considering an underground alternative for Segment 1 from a legal perspective, i.e., doing a full-blown regulatory alternatives analysis, because based on initial engineering considerations it could reasonably be determined that undergrounding would not work for myriad reasons associated with practicability, including cost, transportation logistics, and construction challenges, many of which would increase negative environmental impacts compared to an overhead line.[53]

He added that "Segment 1's relative remoteness, topography, geology, hydrology, and long stretches of ROW between access points make it <u>inherently unsuitable</u> for burying an HVDC cable. Engineering and other power line construction professionals . . . would not want to invest scarce

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[49] *Id.*
[50] Feb. 28, 2019 Pre-filed Direct Test. of Brian Berube (CMP) at 4–5.
[51] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 3.
[52] Apr. 19, 2019 Pre-filed Sur-Rebuttal Test. of Gil A. Paquette (Intervenor Group 3) at 7.
[53] *Id.* at 3–4 (emphasis added).

time, money, and resources in analyzing a fruitless option."[54] These statements clarify why CMP did not initially evaluate undergrounding. Additional credible and unrebutted evidence was presented that substantively proves that CMP's initial determination was correct. The following sections will summarize the evidence and demonstrate that undergrounding is neither practicable nor environmentally beneficial.

i. Undergrounding is Impracticable Based on Cost.

Mr. Dickinson testified that undergrounding "is not reasonable or feasible because the costs of doing so would defeat the purpose of the Project."[55] Burying NECEC "would have resulted in the Project not being cost competitive" in the RFP.[56] Appendix F of Exhibit CMP-1.1-A, coupled with Exhibit CMP-1.1-B, confirm that undergrounding would have dropped NECEC's ranking to ninth, thus defeating its purpose.[57]

At the hearing, other witnesses explicated the prohibitive costs of undergrounding. "In general, underground construction costs five to seven times and much as overhead construction. Specific site conditions such as shallow rock and wetlands crossing can increase that price difference significantly."[58] For NECEC, undergrounding in Segment 1 "would result in an incremental project cost of $645 million,"[59] increasing the total project cost to $1.6 billion.[60] Additionally, undergrounding "would have up to a 33 percent higher incremental operations and maintenance cost" than overhead."[61] Given CMP's winning bid of $950 million, coupled with its significant Project improvements at its own expense—undergrounding at the Kennebec River for

[54] *Id.* at 4.
[55] Mar. 25, 2019 Pre-filed Rebuttal Test. of Thorn Dickinson (CMP) at 2–3.
[56] *Id.* at 8.
[57] *Id.* at 10.
[58] Tr. 341:20–22 (May 9, 2019).
[59] *Id.* at 348:17–18.
[60] *Id.* at 348:20–21.
[61] *Id.* at 350:19–23..

about $31 million[62] and overhead modifications for about $11 million[63]—undergrounding is impracticable on the basis of cost alone. Mr. Dickinson confirmed "there would be a tipping point where the conditions would be too expensive and too burdensome and [CMP] would . . . not go forward with it."[64] Undergrounding is perhaps the one condition that, in isolation and to any extent, would push NECEC beyond its tipping point solely because of cost.

ii. Undergrounding is not Practicable Solely Because it is Technologically Possible.

At the hearing, Mr. Dickinson offered a high-level explanation for NECEC's technological design. The alternating current ("AC") Canadian electric grid is asynchronous with the AC U.S. electric grid, so a "clutch" must be used to align their respective sine waves and "a direct current ["DC"] system provides that clutch."[65] Specifically:

> By converting from [AC] in Quebec to [DC] and then from [DC] back to [AC] you have that clutch . . . Now, as soon as you make that commitment, the . . . HVDC line actually is much more efficient in delivering energy -- probably about twice as efficient at delivering energy over long distances. So once you . . . have an engineering requirement of creating a conversion from AC to DC from DC back to AC, the best thing you can do is to try to broaden out . . . that spread between the converters and that's why the converter station [is] 50 or so miles into Quebec and then in[] Lewiston . . . .[66]

Thus, Mr. Dickenson suggests DC is a better option than AC in this circumstance. Based on cost (and other factors explained below) and desire to meet the Project's purpose, CMP reasonably chose an overhead DC option.

On behalf of NextEra, Mr. Russo argues that an underground HVDC line is practicable because it is technologically possible and would be less "unusual" than overhead.[67] He asserts that HVDC lines similar to or shorter than NECEC are typically underground and do not use voltage-source converter technology, citing three proposed but not developed, out-of-state examples that

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[62] *Id.* at 347:22–348:1.
[63] *Id.* at 348:3–4.
[64] *Id.* at 441:15–23.
[65] Tr. 279:14–25 (Apr. 1, 2019).
[66] *Id.* at 279:19–280:7.
[67] Tr. 214:17–23 (Day Session, Apr. 2, 2019).

would use terrestrial DC burial: TDI (Vermont, 57 miles), Green Line (New York and Vermont, 20 miles), and Northern Pass (New Hampshire, 60 miles).[68]

At the hearing, Mr. Russo held himself out as an expert with specific knowledge of NECEC: "I'm an engineer and economist. Throughout my career I've analyzed probably hundreds of power plants and transmission lines as everything from an academic researcher to a power plant engineer, <u>so I'm quite familiar with the issues behind NECEC</u>."[69] But when asked basic questions about his thesis and NECEC, Mr. Russo's answers reveal: (1) the baselessness of his argument; (2) a lack of relevant qualifications; and (3) most critically, NextEra's ulterior motive. Mr. Russo's resumé shows his expertise is in electricity markets, not the development, construction, engineering, or operation of HVDC transmission lines, above or below ground. Mr. Russo's presence as NextEra's only witness, and as a witness who filed only direct testimony, is evidence itself of the weakness of NextEra's argument.

When asked why it would be typical to bury a transmission line like NECEC, Mr. Russo acknowledges that location controls: "I think it depends on . . . the <u>unique circumstances in geography</u>. Many of them are under water connecting different islands or bodies of water. The design of transmission lines that interconnect systems is <u>very, very site dependent</u>."[70] He admits to no "right" answer: "I'm not sure that there is a rule of thumb that . . . below certain lengths something needs to be buried in DC."[71] His simplistic "research" uncovered only "that an AC line of 150 miles is pretty common. A DC line of 150 miles is less common."[72]

With no site-specific knowledge or "rules of thumb" as to why NECEC should be buried, Mr. Russo even concedes that there are reasons for NECEC's design, being that it is "not outdated

[68] Feb. 15, 2019 Pre-filed Direct Test. of Christopher Russo (NextEra) at 3–4.
[69] Tr. 214:1–6 (Day Session, Apr. 2, 2019) (emphasis added).
[70] Tr. 179:24–180:4 (Day Session, Apr. 4, 2019) (emphasis added).
[71] Tr. 180:4–7 (Day Session, Apr. 4, 2019).
[72] *Id.* at 180:7–9.

technology" and an HVDC component is "necessary" to connect Quebec and New England."[73] While that component could be "one inch,"[74] a longer DC line would "offer significant advantages in terms of efficiency."[75] Nonetheless, Mr. Russo asserts NECEC should have an alternative design, either "as an AC line, in which case alternative Maine-based renewables in western Maine could be interconnected or . . . undergrounding."[76]

Mr. Russo lacks expertise to make any meaningful underground arguments, let alone that burying NECEC in western Maine is practicable. When asked why shorter HVDC lines are typically buried, he stated: "that delves into areas of electrical engineering where I'm not sure I have the necessary data to be able to answer that accurately."[77] When asked if faults is a reason to go underground, Mr. Russo replied: "I'm not sure I have the information at my fingertips or available to say that one particular configuration is more or less vulnerable and that's something … probably be best answered by CMP and its engineers."[78] When asked if he considered the 50-mile overhead portion of NECEC in Canada, Mr. Russo acknowledged he did not.[79] When asked if HVDC lines could be direct-buried, he hedged that "this is getting into specific engineering issues. I can offer a general answer, which is that most high voltage DC lines of this size or magnitude probably would need to be in a concrete vault. I can't imagine this would be direct buried, but I suspect that's a question that would be specific to undergrounding the line and I'm not sure that I've done enough research to be able to answer questions about this one specifically . . .

[73] Tr. 243:1–5 (Day Session, Apr. 2, 2019).
[74] *Id.* at 243:7–8.
[75] Tr. 170:10–11 (Day Session, Apr. 4, 2019).
[76] *Id.* at 243:21–244:1.
[77] *Id.* at 281:21–24.
[78] *Id.* at 282:10–14.
[79] *Id.* at 180:24–25.

."[80] This answer, in particular, goes beyond a lack of understanding; it demonstrates a flawed understanding and is rebutted by Mr. Bardwell and Mr. Paquette.[81]

Mr. Russo could also provide no answers about vegetation ("I am not sure I have the necessary expertise to comment."[82]); underground corridor width ("I am not sure I feel comfortable enough . . . to offer you a specific number today."[83]); and cooling requirements ("I have not done a detailed engineering study nor am I necessarily qualified to do so for undergrounding a NECEC line . . . . That gets to sort of matters of detailed . . . electrical engineering that may be specific to this project . . . ."[84]). Most tellingly, when asked about transitioning between overhead and underground, Mr. Russo stated that "everything is feasible it [sic] if you have enough money, right."[85] In light of his inability to answer basic questions, and apparent belief that money is feasibility, Mr. Russo's generic observations about the length of AC versus DC lines should be given little weight; his argument that undergrounding NECEC in western Maine is practicable should be dismissed entirely.

Mr. Russo's "other" technological theory, that NECEC should be AC, curiously does not appear in his direct testimony. At the hearing, he stated that "construction of the line as a DC technology does, in fact, preclude the connection of renewables in western Maine to the line."[86] He describes NECEC as "essentially a toll highway from Quebec to Lewiston with … no exits in the middle."[87] When asked by Commissioner Reid why relatively short HVDC transmission lines are "typically buried if they're not under water given that it's more expensive,"[88] Mr. Russo replied:

[80] Tr. 181:7–15 (Day Session, Apr. 4, 2019).
[81] *See infra* § (2)(C)(ii)(d).
[82] Tr. 181:25–182:1 (Day Session, Apr. 4, 2019).
[83] *Id.* at 182:12–15.
[84] *Id.* at 183:14–184:11.
[85] *Id.* at 182:22–23.
[86] Tr. 215:3–5 (Day Session, Apr. 2, 2019).
[87] Tr. 170:3–9 (Day Session, Apr. 4, 2019).
[88] *Id.* at 280:12–14.

"my testimony is essentially that [NECEC] sort of stands out as unusual and I think [there are] compelling reasons why it perhaps should have been constructed as an AC line . . . ."[89] This exposes NextEra's real motivation.

Mr. Russo apparently believes it would be feasible for Maine renewables to interconnect to NECEC if it were AC. But Mr. Russo ignores the fact that NECEC is 1,200 MW, the maximum "single loss of supply condition" for ISO-NE.[90] For reliability, ISO-NE "[does not] want any individual line . . . that's more than 1,200 [MW] to have the probability of dropping off"[91] because "the risk . . . is too significant."[92] Given that NECEC is maxed out and fully subscribed (CMP would provide firm transmission service to Massachusetts utilities (1090 MW) and Hydro Quebec (110 MW)), it would not be feasible for Maine renewables to interconnect to NECEC, whether AC or DC. Without firm capacity rights, new renewables would have to rely on the possibility of energy-only, spot market transmission and would not be financeable. Thus, a second line would have to be constructed to facilitate the realistic interconnection of any renewables proposed in western Maine; NECEC's technological design in no way precludes this from happening. Further, the stipulation approved by the MPUC would expressly facilitate additional Maine renewables.[93]

Mr. Tribbett also refutes Mr. Russo's contentions. Contrary to Mr. Russo's assertions, "overhead HVDC transmission lines are capable with volt[age]-source converter HVDC technology,"[94] as confirmed by "multiple HVDC converter vendors"[95] during CMP's proposal due diligence and the existence of "at least two additional examples."[96] Further, Mr. Russo's examples

[89] *Id.* at 280:24–281:2 (emphasis added).
[90] Tr. 281:9–10 (Apr. 1, 2019).
[91] *Id.* at 281:10–12.
[92] *Id.* at 282:12–13.
[93] May 24, 2019 Group 3 Response to the Climate Change Comments Filed by Group 4 on May 9, 2019 at 11–12 (summarizing Stipulation provisions supportive of renewables and/or reducing greenhouse gas emissions).
[94] Tr. 349:5–6 (May 9, 2019).
[95] *Id.* at 349:11.
[96] *Id.* at 349:17–20.

demonstrate impracticability rather than practicability because each project cited failed to win the RFP or otherwise secure long-term transmission rights and meet their project purposes.[97] When asked whether the projects cited by Mr. Russo could "from a technical standpoint" be overhead,[98] Mr. Tribbett conceded the possibility but noted the other projects were smaller, "generally . . . 1090 [MWs] or less."[99] NECEC "crossed the [technological] threshold"[100] due to its higher power transfer capability (1,200 MW). Because the other projects would be capable of delivering less energy, they could match each of two overhead conductors with a single underground cable, whereas with NECEC "the power transfer requirements are significantly higher and that requires [CMP] to use two underground cables for each of the one overhead lines"[101] plus a spare.[102] Mr. Russo overlooks this major technical difference between NECEC and his examples, which difference adds substantial cost and complexity to undergrounding NECEC while underscoring how expensive the other projects are given their lower power transfer capabilities and lesser cable requirements.

In sum, Mr. Russo's testimony is vague, irrelevant, and soundly refuted. He filed no rebuttal, sur-rebuttal, or supplemental testimony to defend his initial and only positions. To the extent that his arguments are given any weight, they must be considered in light of his lack of credibility, as well as NextEra's lack of credibility in this proceeding, as described below.

Since NECEC was selected winner, NextEra has intervened in six regulatory proceedings[103] and has recently appealed the MPUC's order granting NECEC a Certificate of

[97] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Tibbett (CMP) at 3.
[98] Tr. 462:23–463:1 (May 9, 2019).
[99] *Id.* at 463:2–6.
[100] *Id.* at 463:11–12.
[101] *Id.* at 463:24–464:1.
[102] *Id.* at 473:23–25.
[103] In addition to these proceedings, NextEra intervened in MPUC docket 2017-00232, as well as in each of the Massachusetts Department of Public Utilities dockets concerning approval of NECEC's contracts with Massachusetts utilities, 18-64, 18-65, and 18-66.

Public Convenience and Necessity to the Maine Law Court.[104] Two primary reasons for such opposition should discount NextEra's arguments here. First, NextEra competed in the RFP to use the same corridor as NECEC, lost, and has no contracts for the output of its proposed project. Now it seeks to force undergrounding with full knowledge that such a condition would defeat NECEC. Second, NextEra has an interim vested interest in taking advantage of New England's high electricity prices and precarious reliability circumstance with its oil-fired and nuclear generation capacity.[105]

CMP submitted multiple bids to the RFP, one of which was a joint proposal with NextEra called the Maine Clean Power Connection ("MCPC").[106] The NextEra versions of the MCPC included a high-voltage AC overhead transmission coupled with generation facilities in Maine. The overhead transmission "would have essentially used the same corridor" as NECEC.[107] Despite NextEra's insistence that NECEC be buried, it did not ask CMP to consider an underground alternative for MCPC.[108] The NextEra versions of the MCPC would have also involved construction of new solar and wind generation facilities as well as battery technology in Maine near the northern terminus of NECEC,[109] including "the necessary amount of acreage in order to produce the amount of wind [and] solar"[110] and "required generator lead lines to connect to the transmission line."[111] The obvious inference, confirmed by Mr. Dickinson, who had knowledge of both the MCPC and NECEC proposals, is that NextEra's project would have "[d]efinitely [created] a larger [environmental] footprint in Maine" as compared to NECEC.[112] Beyond a larger

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[104] *NextEra Energy Resources, LLC v. P.U.C.*, Law Court Docket No. PUC-19-182, Notice of Appeal (May 7, 2019).
[105] *See*, Group 3 Response to the Climate Change Comments, *supra* note 93, at 2.
[106] Tr. 152:1–11, 244:12–18 (Apr. 1, 2019) (erroneously referring to NextEra's project as "Maine Power Connect").
[107] *Id.* at 153:24–154:4.
[108] *Id.* at 154:5–11.
[109] *Id.* at 152:1–11.
[110] *Id.* at 245:8–10.
[111] *Id.* at 245:17–20.
[112] *Id.* at 154:17–24.

environmental footprint, the MPCP would have created less capacity and "significantly less energy" than NECEC "because the [relatively low] capacity factor of wind and solar" compared to guaranteed, dispatchable hydropower.[113] High cost and low production likely doomed the MCPC despite CMP being "equally excited about all of [its] bids"[114] and NextEra's cheerleader in the Town of Caratunk. As stated in Group 3 Cross Exhibit 1:

> Caratunk has already twice supported NextEra for a solar farm within its boundaries. This DC line blocks access to solar or other renewable energy projects in Caratunk and Somerset County. One such solar project lost in direct competition to this NECEC. The valuation benefit from CMP's additional transmission lines does not even compare to a large solar project in Caratunk. Caratunk is against NECEC project if it prevents future renewable energy opportunities that provide for a huge tax benefit to all landowners and significantly increase Caratunk's valuation. <u>Therefore, Caratunk sees this project as reducing its tax revenue</u>.[115]

Despite its substantial factual inaccuracies related to energy, the Caratunk letter confirms that NextEra and others are speciously using environmental arguments to protect their economic interests. Group 3's testimony on energy and economic benefits was stricken, but it did not hide its motivation to participate in these proceedings.

NextEra claims to be a renewable energy company.[116] There is no doubt that NextEra develops and owns renewables in the U.S., but this claim is demonstrably misleading with respect to Maine and New England. In Group 3's response to Group 4's climate change comments,[117] it highlighted that "[a]s of this writing, [NextEra] lists on its website the ownership of 863 megawatts of oil-fired capacity, three megawatts of small-scale solar capacity, and zero megawatts of wind capacity in Maine."[118] NextEra owns 1,250.2 MW of nuclear capacity in New Hampshire and 311 MW of natural gas capacity in Massachusetts, for a total of 2,424 MW of non-renewable generation capacity and only 35.3 MW of renewable generation capacity in New England. As it

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[113] *Id.* at 246:6–10.
[114] *Id.* at 246:1–2.
[115] Group 3 Cross Ex. 1 at ¶ 3 (emphasis added).
[116] *See* Tr. 99:5–8 (Day Session, Apr. 2, 2019) ("I'm representing Group 8, which is comprised solely of NextEra Energy, which is an entity which owns and operates renewable Maine energy projects.").
[117] Group 3 Response to the Climate Change Comments, *supra* note 93.
[118] *Id.* at 2 n.2 (citing https://www.nexteraenergyresources.com/pdf_redesign/portfolio_by_fuel.pdf).

relates to Maine and New England, NextEra is decisively a non-renewable energy company, which is a critically important fact given the resources it does own and New England's particular energy circumstance. NextEra's oil-fired peaking resources and baseload nuclear asset benefit from high electricity prices and would be harmed by NECEC's price suppression effect.[119] Indeed, at the MPUC-endorsed price suppression effect of about $2.4/MWh,[120] assuming a 90% capacity factor of Seabrook alone, the financial impact of NECEC on NextEra will exceed $20 million per year. Consumers save this amount. Further, as ISO-NE grapples with solutions to "fuel security," Wyman Station and Seabrook, both resources with on-site fuel, stand to benefit from enormous subsidies.[121] However, as noted by ISO-NE, another solution to "fuel security" is transmission coupled with firm hydropower.[122] Thus, NECEC has the real potential to reduce the value of the subsidies that might otherwise be gifted to NextEra.

The DEP and LUPC should see NextEra's alternatives argument for what it is: a transparent attempt to kill NECEC so that NextEra might be able to develop its own renewables using the same corridor at some unknown point in the future (which is not inconsistent with NECEC's overhead DC design), while benefitting from extremely high electricity prices and fuel security risk in the interim period. As a matter of policy, competitors should not be allowed to powerfully influence permitting proceedings when their primary interests are so obviously economic, not environmental.

iii. Undergrounding is Logistically Impracticable.

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[119] Group 3 Public Comments, *supra* note 4, Appendix A, "Pre-filed Direct Testimony of Glenn S. Poole," at 13–24, 26–29.
[120] MPUC Order, *supra* note 2, at 28-30 (Daymark found savings of $3.7/MWh, LEI found savings of about $1.17/MWh, and the PUC found the range to be credible.)
[121] Group 3 Public Comments, *supra* note 4, at 14–15, 21–26.
[122] *Id.* at 23–24.

Direct burial is the "lowest cost underground installation method"[123] and would be the primary undergrounding method in Segment 1, if undergrounding were practicable.[124] Considering only direct burial, and not the more challenging construction methods that might be needed for certain roads and waterbodies, the logistical complications compared to the overhead proposal render undergrounding impracticable. As opposed to just two overhead conductors, "five polymer insulated power transmission cables" would be needed.[125] Beyond increasing cost, more than doubling the amount of wire would create a cascading set of transportation, construction, and operational logistics challenges. Because of cable shipping length constraints (approximately 2,500 feet), splices would have to occur about every 2,200 feet using "weather- and humidity-controlled enclosures."[126] These constraints make transportation, construction, and subsequent operation more difficult, while increasing fixed and variable costs and permanent and temporary impacts.

To direct-bury in western Maine, "a continuous trench (rather than placing structures every 800 to 1,000 feet)"[127] would need to be excavated in segments consistent with shipping lengths.[128] A 75-foot corridor would need to be cleared and maintained.[129] A typical trench would be about five feet wide at the bottom, with a minimum surface width of 12 feet and minimum depth of six feet.[130] Digging an extensive continuous trench is "particularly susceptible to cost and productivity impacts due to unforeseen subsurface conditions, such as shallow bedrock, boulders, cobbles, and unstable soil or bedrock conditions" for which targeted soil sampling and borings is

[123] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 4.
[124] *Id.* at 9.
[125] *Id.* at 3.
[126] *Id.* at 4.
[127] *Id.* at 24.
[128] *Id.* at 4.
[129] *Id.* at 25.
[130] *Id.* at 4.

"impossible."[131] For shallow bedrock, "trenching will require blasting, hoe ram, or similar excavation methods."[132] Trenching would also "require additional control measures for soil erosion, sedimentation, and dust generation."[133] Unlike overhead construction, a trench could not avoid sensitive areas like wetlands and streams.[134]

Splicing five cables together every 2,200 feet for 53.5 miles is also logistically daunting. At each splice location, "a large excavation, approximately 60 feet long, 20 feet wide, and seven feet deep would be opened."[135] A concrete pad would be poured in the bottom, with a temporary structure erected over it.[136] Precast concrete enclosures approximately 12 feet long and four feet wide would be placed over each joint.[137] The jointing pit would then be backfilled with sand and perhaps native soil. Permanent access roads would need to be cleared and maintained to each jointing location, generally following the ROW but routed around surface obstacles.[138]

Due to trenching and splicing, undergrounding is slower than overhead construction. "Construction at each splicing location would require 2-3 weeks of continuous activity. Direct buried cable sections would require continuous work along the 2,200-foot-long trench for approximately three weeks."[139]

Undergrounding is also logistically impracticable because of reliability issues. Given the terrain and limited access points, it would take "substantial time to locate and repair" cable damage, creating "increased risk for extended outages."[140] While less likely than overhead faults,

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[131] *Id.* at 14.
[132] *Id.* at 4.
[133] *Id.* at 12.
[134] *Id.* at 13.
[135] *Id.* at 4.
[136] *Id.* at 4.
[137] *Id.* at 4.
[138] *Id.* at 12.
[139] *Id.* at 14.
[140] Tr. 341:22–342:1 (May 9, 2019).

cable faults "typically result in more significant damage."[141] In addition to being costly, cable faults are "time-consuming to identify, isolate, and repair, and usually require dispatching heavy equipment to the affected section to repair or replace the cable."[142] Repair time "increases in cold weather climates, with access limitations due to winter ground conditions."[143] While overhead outages are usually restored in a few hours, repairing an underground line is a "lengthy process" with a "best case" of "two to three weeks, more often . . . four to five weeks" and potentially "out to 12 [weeks]."[144] Outages of this duration would be unacceptable because NECEC "has a requirement that [it] be available 90 percent of the time in each month, which means having an outage of more than six days would be a violation of that agreement."[145] Beyond the contractual obligation of NECEC, the ISO-NE region, already predicted by ISO-NE to face the risk of "rolling blackouts or controlled outages that disconnect blocks of customers sequentially" by 2024,[146] faces the imperative to ensure reliability, including the rapid restoration of outages.

Beattie Pond is a good example of the logistical challenges associated with maintaining underground reliability. To access jointing locations, "CMP would need to add alternate access points and secure them against third party access."[147] CMP would also "need to implement local protection and monitoring systems"[148] that would require establishing AC station service to Beattie Pond through 37 miles of private road from Route 201.[149] Further, logging roads needed for access are not plowed in winter.[150] When comparing underground to overhead access needs at Beattie Pond, Mr. Bardwell explained that "to make an underground repair you're going to be excavating[,]

[141] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 16.
[142] *Id.*
[143] *Id.*
[144] Tr. 418:7–9 (May 9, 2019).
[145] *Id.* at 418:10–15.
[146] Group 3 Public Comments, *supra* note 4, at 22 (citing ISO-NE's "Operational Fuel-Security Analysis").
[147] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 19.
[148] *Id.* at 19–20.
[149] *Id.*
[150] *Id.* at 20.

. . . bringing in very heavy equipment to get into the vaults and rebuild the joint. In either case, you're going to have to bring in what is not normally off-road equipment and you're going to have to get it in through whatever conditions that road is in and the weather." [151] For overhead repairs, however, a line truck "meant to go into rather nasty locations" would generally suffice.[152]

Mr. Paquette expounded on "the full cost and environmental implications associated with many logistical aspects to undergrounding" in an area like Segment 1,[153] summarizing that:

- Underground cable is specialized, heavier, and created in shorter lengths than overhead conductor for terrestrial application (≈2,000-2,500 feet underground versus 10,000 feet overhead).
- For Segment 1, more reels (≈700 underground versus 112 overhead) and trailer trucks (≈234 underground versus 28 overhead) would be required to transport underground cables than overhead conductor.
- Unlike overhead conductor, which can be pulled and tensioned from sites three miles apart, underground cable must be transported to the installation site (trench) spanning the entire ROW.
- With more reels and trucks for underground cable that must access the entire ROW, more mats and bridges, and perhaps some permanent improvements, would be needed than for an overhead line. More and better access roads would likely be needed due to heavier and more frequent traffic.
- Trenching six feet deep, five feet wide at the base, and between 14 feet and 23 feet wide at the opening would occur for 53 miles without interruption or the ability to avoid certain sensitive and protected resources. Testing of all soils along the ROW would not be practicable, so encountering unexpected instances or areas of unstable soils and ledge would add delay, costs, and additional logistical concerns.
- When trenching, ledge would need to be blasted or hoe-rammed wherever encountered.
- Thermal sand would likely be required along the majority of the Segment 1 ROW to backfill the cable trench, requiring excavation and removal of native soil, importation by dump truck of thermal sand, and thus heavy-duty temporary facilities (bridges and mats) or permanent facilities (bridges). Unlike with overhead conductor, sensitive (e.g., wetlands) and challenging (e.g. ledge) areas could not be avoided through structure placement and spanning.
- Splicing, requiring the use of specialized trailers, would occur along the entire ROW at about 140 locations, adding logistical concerns and environmental impacts relative to overhead conductor.
- At each splice, a permanent concrete vault (≈26'x 8'x 8') would need to be constructed for protection and access, often requiring a permanent access road.
- Repair or replacement of damaged cable or cable splices would cause extensive disruptions (e.g., heavy equipment, mats and bridges, excavating, splicing trailer, etc.) and protracted outages, unlike with overhead conductor.[154]

It is worth noting that Mr. Paquette conservatively assumed NECEC would require four overhead conductors versus the two actually required, thus underestimating the logistical complexity of undergrounding relative to overhead construction. Nonetheless, he concludes that

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[151] Tr. 431:20–432:4 (May 9, 2019).
[152] *Id.* 431:20–432:4.
[153] Apr. 19, 2019 Pre-filed Sur-Rebuttal Test. of Gil A. Paquette (Intervenor Group 3) at 4.
[154] *Id.* at 16–17.

"undergrounding is not an alternative to NECEC that should have been or should be considered."[155]

Mr. Paquette also described his experience developing the Northeast Energy Link as "peeling [an] onion"[156] with the last layer being thermal sand, which was "a shock to everybody on the team aside from the cable manufacturer."[157] Thermal sand is a special kind of sand with very uniform division of grain sizes and a high density when compacted[158] that is used to dissipate heat.[159] The warranty provided by cable manufacturers would dictate the use of thermal sand.[160] Unlike with the bedding sand manufactured from trench spoils and used in small quantities at discrete locations for the Maritimes and Northeast Pipeline in Maine, there is a "much lower probability"[161] of finding sufficient thermal sand for a continuous trench in Segment 1.[162] Thermal sand would need to be imported by heavy-duty dump trucks, effectively requiring the construction of a road down the ROW.[163] In Mr. Paquette's experience, "the need for, logistics concerning, and cost of thermal sand is the single most overlooked aspect of undergrounding an HVDC transmission line."[164]

Mr. Paquette further emphasized the challenges associated with having to travel down the full length of the ROW with heavy equipment versus being able use targeted access roads and limited construction paths to construct poles. Whereas transmission structures[165] and pipeline are offloaded on access roads and then transported down the ROW in individual pieces,[166] with dense,

[155] *Id.* at 16.
[156] Tr. 355:2–5 (May 9, 2019).
[157] *Id.* at 356:4–8.
[158] *Id.* at 443:7–9.
[159] *Id.* at 442:16–20.
[160] *Id.* at 442:24–443:3.
[161] *Id.* at 444:12–14.
[162] *Id.* at 444:12–20.
[163] *Id.* at 356:11–14.
[164] Apr. 19, 2019 Pre-filed Sur-Rebuttal Test. of Gil A. Paquette (Intervenor Group 3) at 14.
[165] Tr. 446:1–447:12 (May 9, 2019).
[166] *Id.* at 445:7–446:2.

copper-infused cable you must transport a cable reel down the ROW to the splice locations.[167] "The biggest difference between overhead and underground construction is the type of equipment that would be required . . . . . For overhead construction, tracked excavators, tracked cranes, and heavy-duty pickup and bucket trucks must access the ROW … [and this equipment] is specifically designed for traveling a cleared ROW without the need for building a temporary or permanent gravel road for construction."[168]

Therefore, the weight of evidence demonstrates that undergrounding NECEC through Segment 1 is logistically impracticable.

iv. Undergrounding is Not Less Environmentally Damaging.

For many of the reasons that undergrounding is impracticable, it is also not less environmentally damaging. The need to dig a continuous trench and perform construction activities throughout the ROW increases temporary environmental impacts relative to overhead construction.[169] "[A]n underground project has far more natural resource impacts especially to streams and wetlands than would an overhead line"[170] because of the continuous nature of its disruption and the heavier, specialized equipment required for undergrounding. To accommodate excavation equipment, cable reels, splice trailers, splice vaults, and importation of thermal sand by dump truck, a substantial travel lane would need to be constructed throughout the ROW, potentially requiring extensive grading, double or triple matting, new bridges, or existing bridge reinforcements.

Additionally, the permanent environmental impacts of undergrounding would be similar to, if not greater than, those of an overhead line. A corridor 75 feet wide would need to be cleared

[167] *Id.* at 446:5–7.
[168] May 1, 2019 Pre-filed Supplemental Test. by Gil A. Paquette (Intervenor Group 3) at 7.
[169] Tr. 341:5–16 (May 9, 2019).
[170] *Id.* at 357:8–10.

and maintained,[171] but with more careful attention to tree roots.[172] Large concrete splice vaults would be permanently installed approximately every 2,200 feet, to which a permanent access road would need to be established. In the remote region of Segment 1, such roads could require clearing, grading, bridges, vegetation management, and increased impervious surface area.

Thus, the temporary and permanent environmental impacts associated with undergrounding render it an equally or more environmentally damaging alternative to overhead construction.

C. The Undergrounding Alternative in Existing Corridors

Several parties argue that undergrounding along or within existing corridors is practicable. Dr. Publicover asserted that "the proper approach is burial along existing disturbed corridors."[173] Mr. Wood's preferences are "co-location with Route 201, including burial" and "co-location with the Spencer Road including burial."[174] These arguments are easily dismissible based on the general impracticality of undergrounding and the specific reasons set forth below.

As explained by Mr. Freye, from a siting perspective, "putting any transmission line either overhead or underground along a road is not necessarily a good idea unless . . . the roads are very straight and the land is very flat on either side."[175] However, "roads tend to be a series of curves" whereas "transmission lines . . . are a series of straight tangents."[176] "[W]hen you try to match the two together you end up with angle points that are in wetlands" and "pole locations end up in low spots instead of high spots."[177] In the Project area, there are "a lot of terrain changes" and the

[171] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 25.
[172] Tr. 420:5–23 (May 9, 2019).
[173] *Id.* at 62:8–9.
[174] *Id.* at 114:3–7.
[175] *Id.* at 407:19–23.
[176] *Id.* at 407:24–408:1.
[177] *Id.* at 408:1–4.

"roads are not straight."[178] Moreover, private roads, such as the Capitol Road, "tend to move frequently."[179] Forest management owners "have acquired land and completely rebuilt the road system"[180] The foreseeable persistence of this dynamic creates risk in co-locating a transmission line with a logging road.[181]

From a constructability perspective, Mr. Paquette testified that mobilizing cable within a road system "was very difficult and one of the reasons why [the Northeast Energy Link] didn't move forward."[182] The primary difficulties encountered by Mr. Paquette were access to the ROW and thermal sand.[183] Because use of the public road was specifically prohibited, an access road down the ROW needed to be constructed using cost-prohibitive matting for hauling thermal sand across wetlands.[184] Mr. Paquette described Segment 1 as "actually worse" than the setting for the Northeast Energy Link based on the "remoteness . . . lack of access roads" and need to use and upgrade logging roads and skidder trails, as opposed to public roads.[185]

While undergrounding in a highway is "technically possible," it is not necessarily "feasible."[186] "The installation of splicing vaults in travel lanes of highways is prohibited by the Maine Department of Transportation (MDOT) and there is insufficient room adjacent to the travel lanes."[187] The MDOT resists longitudinal installations in highways. Even if the MDOT allowed it, underground construction in a roadway would cause "particularly significant" public impacts due to heavy equipment, longer construction time, and disruption to traffic.[188]

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[178] *Id.* at 409:12–13.
[179] *Id.* at 409:14–16.
[180] *Id.* at 409:19–20.
[181] *Id.* at 409:20–23.
[182] *Id.* at 400:16–20.
[183] *Id.* at 425:2–10.
[184] *Id.* at 425:2–10.
[185] *Id.* at 425:16–25; 426:1–4.
[186] May 1, 2019 Pre-Filed Supplemental Test. by Justin Bardwell (CMP) at 12.
[187] *Id.* at 12.
[188] Tr. 341:11–16 (May 9, 2019).

Selecting a new, co-located corridor also requires consideration of where a connection to Hydro-Quebec's system is possible. Any connection "needs to originate at one of two 765 kV substations in southern Quebec."[189] CMP chose one connection after assessing environmental, social, and physical constraints in Maine and reviewing infrastructure and land ownership in Quebec. "Relocating … would require the acquisition and vetting of new corridor by both CMP and Hydro-Quebec."[190]

i. Route 201/Spencer Road/Jackman Tie-line

Group 6 and others have specifically advocated an underground alternative co-located with Route 201 and/or Spencer Road. In rebuttal, CMP evaluated an alternate underground route that "[f]rom East Moxie Township . . . follows State Rt. 201 before turning west along Spencer Rd. for a total of 59 miles before reaching the Canadian border."[191] The in-road construction method "would be concrete encased duct bank with several HDD crossings."[192]

A transmission line along Route 201 is not a practicable alternative for siting and constructability reasons. Whether co-location with Route 201 is technically feasible, economically viable, and/or a satisfactory option is a complex question. "For example, what portions of the Project would be co-located with Route 201: Moscow to Quebec, Johnson Mountain to Quebec, or something less? What would co-location entail: entirely within the highway limits, acquisition of additional adjacent land, or crossings under the travel lanes? What other constraints would be involved: time frame to complete, use of eminent domain, or going around or through The Forks/West Forks, Jackman/Moose River?"[193]

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[189] *Id.* at 338:17–339:4.
[190] *Id.* at 338:17–339:4.
[191] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 9.
[192] *Id.* at 9.
[193] May 1, 2019 Pre-Filed Supplemental Test. by Kenneth Freye (CMP) at 4.

Route 201 is a “nationally and state recognized scenic byway” and NECEC was “purposely designed in order to minimize the viewshed from Route 201.”[194] Transitioning from underground to overhead along Route 201 would be impracticable from a visual perspective alone.

Because Route 201 is a state highway, the MDOT “prohibits the construction of manhole entries within the travel lanes and restricts the construction of longitudinal installation within travel lines.”[195] Burying a transmission line within the Route 201 ROW is not viable for many reasons, but “[t]he biggest one and the hardest to overcome is that the [MDOT] will not allow the line to be built in the travel lanes and there is insufficient room alongside the travel lanes to actually install the line.”[196] The “insufficient space” within the Route 201 ROW[197] is based on the width of highway, the width of a duct bank, the ability of tree roots to extend 35 feet, and additional grading requirements.[198] Because CMP does not own a corridor along Route 201, it would need to acquire additional rights and clearing land outside of the highway limits.[199] Acquiring and clearing such land would be “impractical and virtually impossible” in the villages of The Forks, West Forks, and Jackman/Moose River.[200]

Safely digging a trench requires “a relatively flat surface” which would necessitate “additional side slope grading”[201] where the terrain along Route 201 is steep. The “construction of a duct bank system within Route 201 would have substantial impact to the public” based on “extensive lane closures ” and “[e]xtensive traffic control and substantial barriers . . . to protect the public from the excavations and the workers from the public.”[202] Moreover, an existing

[194] Tr. 464:14–17 (May 9, 2019).
[195] *Id.* at 342:6–11.
[196] *Id.* at 487:15–19.
[197] *Id.* at 342:11–13.
[198] *Id.* at 342:11–13.
[199] *Id.* at 337:22–338:10.
[200] *Id.* at 338:7–10.
[201] *Id.* at 405:20–23.
[202] *Id.* at 342:18–25.

distribution line runs alongside most of Route 201.[203] "The presence of this line rather than indicating a potential pathway actually means much of the available space within the highway limits is currently occupied."[204] "It would not be safe or practical to construct an underground electric transmission line on the same side of the highway as the existing overhead distribution lines" because of the contact-risk associated with heavy-duty equipment.[205] Because the roadside distribution lines switch sides as Route 201 curves, a co-located underground line within highway limits would also need to switch sides, adding construction and logistical concerns. Finally, depending on how much of Route 201 were used, "relocating the interconnection point with Hydro Quebec" and developing a "matching route . . . on the Quebec side of the project" could take "at least several years."[206]

Regarding Spencer Road, a private road "built and . . . maintained for the management of the industrial forest landowners,"[207] CMP verbally discussed co-location with Plum Creek Maine Timberlands, LLC ("PCT"), the then-owner of most of the land along the Spencer Road.[208] Due to concerns about adverse impacts on "PCT's ability to relocate the road from time to time, replace culverts and bridges, construct and maintain ditches and tail ditches, use existing log landing areas and gravel pits, construct new log landing areas and gravel pits, and generally impede access to its abutting land, CMP agreed to generally locate the corridor away from the Spencer Road."[209] Weyerhaeuser subsequently acquired PCT's holdings "after CMP had secured the rights to the

[203] *Id.* at 337:23–25.
[204] *Id.* at 337:25–338:4.
[205] May 1, 2019 Pre-Filed Supplemental Test. by Kenneth Freye (CMP) at 5.
[206] Mar. 25, 2019 Pre-filed Supplemental Test. of Justin Bardwell (CMP) at 12.
[207] Mar. 25, 2019 Pre-filed Rebuttal Test. of Kenneth Freye (CMP) at 5.
[208] May 1, 2019 Pre-Filed Supplemental Test. by Kenneth Freye (CMP) at 5.
[209] *Id.* at 6.

corridor and access roads."[210] CMP, however, spoke to the new owner and "they generally agreed with" CMP's decision.[211]

The Jackman tie line ("JTL") proposal is a variation on the Route 201/Spencer Road co-location alternative that is equally impracticable. Rather than co-locate entirely along Route 201, it is suggested that CMP could co-locate in an existing ROW that is proximate to Harris Dam, extends to Jackman, and traverses two conservation easements and the newly acquired Cold Stream parcel forest.[212] However, the JTL is a 100-foot wide corridor containing an unremovable radial distribution line.[213] To add NECEC to the existing corridor CMP would need to plan for the acquisition of "at least 150 feet."[214] This area would need to be cleared and maintained, making a 250-foot wide corridor and negating alleged fragmentation benefits. Moreover, acquiring additional land within the conservation easements and at the Cold Stream parcel forest would be "very problematic."[215] The same distribution line constraint would apply north of Jackman.[216] At the Canadian border, NECEC would have to find a way to connect to the Appalaches substation in an area relatively more developed than the current Canadian route.[217]

Therefore, based on the evidence cited above and elsewhere in the record, undergrounding NECEC along Route 201, Spencer Road, and/or the Jackman tie line is impracticable.

ii. The Appalachian Trail

Some parties argue that undergrounding within CMP's existing corridor containing a segment of the Appalachian Trail ("AT") is a practicable alternative. The AT is currently "within

[210] *Id.* at 6.
[211] Tr. 395:20–24 (May 9, 2019).
[212] *Id.* at 364:16–365:8.
[213] *Id.* at 364:23–365:1.
[214] *Id.* at 365:20.
[215] *Id.* at 365:4–8.
[216] *Id.* at 366:11–16.
[217] *Id.* at 367:1–6.

and adjacent to an approximately 3,500-foot-long segment of existing CMP transmission line corridor," crossing the existing corridor "in three locations adjacent to Moxie Pond and Trestle Road in Bald Mountain."[218] Critically, the existing corridor contains a 115 kilovolt ("kV") overhead transmission line. An underground alternative here is impracticable for several reasons.

First, the language of the easement granted by CMP to the National Park Service ("NPS") allows only for overhead transmission lines to be developed.[219] The NPS recently denied overhead and underground transmission line rights to Kibby Wind Farm in an existing AT crossing with an overhead line,[220] where Kibby Wind Farm did not already have overhead rights.[221] Kibby Wind Farm was forced to underground across Route 27, and if Route 27 were not there, the project would have been unable to connect to the grid.[222] This demonstrates the general unwillingness of the NPS to negotiate. While CMP could ask to re-negotiate, that does not make sense, except to delay:

> [F]rom an engineering standpoint the CMP easement is 3,000 feet long and then basically the [AT] corridor comes in from the west, hits the CMP corridor, follows it for 3,000 feet and then goes off to the east. If you were just locating a transmission line and you had to go under a thousand foot wide corridor, which is what the [AT] is, you wouldn't do it there. You'd do it in another location because you'd only have a thousand foot underground as opposed to a 3,000 foot and . . . it wouldn't be underneath a pond, which is what this one would entail.[223]

Further, "underground construction would have increased environmental impacts, increased impacts to the public and increased cost to overhead construction."[224] Undergrounding at the AT "would require construction of termination stations within sight of the trail, along with a trenchless crossing of Joe's Hole and the three AT crossings, approximately 3,500 feet long."[225] "This would require a large hydraulic rig to be set up next to the [AT] for several months causing significant

[218] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 17.
[219] Tr. 396:2–19, 439:7–10 (May 9, 2019).
[220] *Id.* at 429:23–431:1.
[221] *Id.* at 440:18–441:14.
[222] *Id.* at 430:9–16.
[223] *Id.* at 439:17–440:3.
[224] *Id.* at 343:7–10.
[225] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 17.

noise and visual impacts."[226] Total construction time could be ten months.[227] The incremental cost of this alternative, with arguably no environmental benefit, would be $28 million.[228]

For these reasons, undergrounding in the existing corridor through which the AT crosses is impracticable.

D. The Taller Pole Alternative

To limit purported fragmentation by retaining full-height or higher vegetation, Group 6 and other parties argue that pole heights can practicably be increased. Group 3 believes that full-height or higher vegetation facilitated by the use of taller poles is a practicable form of mitigation for discrete, highly sensitive areas, such as those proposed by Mr. Beyer. However, using taller poles throughout, in the majority of, or even in a significant minority of Segment 1 is impracticable and would not be less environmentally damaging. Moreover, extensive use of taller poles is unnecessary given CMP's proposed vegetation management practices coupled with selective tapering. It is important to note that "[c]onsultation with IF&W, the resource agency experts in Maine . . . resulted in the recommendation for full height vegetation . . . only in the areas included in CMP's compensation plan and specific to significant wildlife habitat."[229]

With limited exceptions, the majority of NECEC's transmission structures would be standard tangent monopoles made of self-weathering steel,[230] with an average above-grade height of 94 to 100 feet[231] and an average distance of about 1,000 feet between poles.[232] At the top of each pole would be the static wire.[233] Twenty-three feet lower, the conductors would sit, centered

[226] Tr. 343:13–16 (May 9, 2019).
[227] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 18.
[228] *Id.*
[229] Tr. 233:15–20 (May 9, 2019).
[230] *Id.* at 197:6–9, 377:16–24, 379:1–23.
[231] *Id.* at 320:2.
[232] *Id.* at 229:6–9.
[233] *Id.* at 452:4–8.

on the pole with 24 feet between them.[234] All else equal, assuming two "typical" 100-foot tangent structures spanning 1,000 feet of flat terrain, the conductors would sag a maximum of 43 feet, meaning they would be a minimum of 34 feet above ground.[235] The conductor safety zone extends downward 24 feet from this maximum sag point. Looking down the ROW, the conductor safety zone includes the 24-foot horizontal distance between the conductors, plus 15 feet on either side, for a total width of 54 feet.[236] Thus, the conductor safety zone is 24-foot high by 54-foot wide cross-sectional rectangle, centered on each monopole and elevated 10 feet off the ground at the lowest conductor sag point. Consequently, ten feet is the minimum height of vegetation under the wires.[237]

Given these general parameters, most structures would be directly embedded into the substrate without the use of concrete caisson foundations, guying wires, or other anchoring systems, thereby reducing construction impacts and limiting permanent footprint.[238] However, there are no "typicals,"[239] so each pole must be specifically engineered considering myriad variables, including: (1) pole type, height, anchoring (if any), and site-specific factors, such as soil conditions; (2) actual pole span; (3) actual wire sag; (4) the conductor safety zone; (5) topography across the span; and (6) vegetation characteristics, such as species and age/class of trees, within the span.[240] Critically, NECEC's current design and best vegetation management practices allow for taller vegetation under the wires:[241]

> When and if terrain conditions permit, e.g., certain ravines and narrow valleys, capable vegetation will be permitted to grow within and adjacent to protected natural resources or critical habitats where

[234] *Id.* at 314:18–19, 452:4–8.
[235] *Id.* at 452:9–24.
[236] *Id.* at 283:20–25.
[237] *Id.* at 174:6–8.
[238] *Id.* at 345:19–346:5.
[239] *Id.* at 353:1–5.
[240] *Id.* at 244:1–245:17, 286:15–18.
[241] *Id.* at 229:20–230:4, 320:23–321:6.

> maximum . . . growing height can be expected to remain well below the conductor safety zone. Narrow valleys are those that are spanned by a single section of transmission line structure to structure.[242]

There is no reason why CMP could not instruct vegetation management crews to allow higher growth under the wires, where reasonable, unless and until vegetation intrudes into the conductor safety zone.[243] Group 3 believes this sub-alternative is a more practicable condition than taller poles as a general matter.

To attain full-height or higher vegetation beyond where "terrain conditions permit," taller poles would generally be necessary. For a vegetation height of 30 feet (rather than ten feet), a clearance of 54 feet (rather than 34 feet) would be needed, which would dictate an incremental pole height increase of 20 feet, all else equal and assuming flat terrain.[244] For full-height vegetation ("an average of 75 feet based upon the species that are prominent [in a specific location]"[245]), "the delta is 65 feet, so you can assume that all else being equal the average might increase by something like 65 feet per structure."[246]

Depending on the pole currently engineered for a specific location, adding height would likely require the use of concrete caisson foundations. "Assuming monopoles 140 feet tall (the simple average of 130 and 150 feet), concrete foundations would be required, as opposed to directly embedding the structures into the ground, and therefore the construction process would be quite different."[247] With dual Falcon ACSR conductors, an aboveground pole height of about 120-feet is the threshold for requiring a concrete caisson foundation as opposed to direct-embed, but the threshold is "dependent on the soil properties … at that given location" as well as structure type and anchoring requirements.[248] The use of foundations with taller poles, rather than direct-

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[242] *Id.* at 313:10–18.
[243] *Id.* at 321:1–322:17.
[244] *Id.* at 374:5–15.
[245] *Id.* at 285:8–10.
[246] *Id.* at 320:13–16.
[247] May 1, 2019 Pre-filed Supplemental Test. by Gil A. Paquette (Intervenor Group 3) at 3.
[248] Tr. 375:24–377:24 (May 9, 2019).

embedding "typical" poles, adds significant costs, construction impacts, and permanent environmental impacts, the combination of which makes the use of any significant number of these structures impracticable.

Regarding cost, replacing a proposed typical direct-embed tangent monopole with a taller structure would cost between $115,000 and $243,000 more per structure.[249] Additional expense includes the costs associated with a concrete foundation, customized steel pole, and an anchor bolt cage.[250] The maximum delta assumes transitioning from a 100-foot direct-embed tangent pole to a 150-foot pole with a self-supporting caisson foundation."[251] The minimum delta assumes the same height, with a caisson foundation instead of direct-embed."[252] This option might be available "if the spans had to get longer … and you don't necessarily need additional height because the topography is working for you."[253]

Taller poles with foundations would create significant additional construction impacts. First, "a significant amount of excavation would be required" for the foundations, "which can be as large as 10 feet in diameter and 45 feet deep (compared to a splice vault which is 28'x 8'x 8').[254] Excavation near wetlands and other waterbodies, unstable soil, or bedrock, would cause greater impacts.[255] Access roads would need to be improved "to accommodate the additional weight of concrete trucks."[256] Construction sequencing would become more difficult, as CMP would need to excavate, back out, bring in rebar cage, bring in the anchor bolt cage, and set the foundation before getting "back to the same situation that you'd have with the direct embed type structure," at

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[249] *Id.* at 115:12–13.
[250] *Id.* at 378:20–379:11.
[251] *Id.* at 381:1–4.
[252] *Id.* at 381:5–6.
[253] *Id.* at 381:7–10.
[254] May 1, 2019 Pre-filed Supplemental Test. by Gil A. Paquette (Intervenor Group 3) at 4.
[255] *Id.*
[256] Tr. 345:23–346:8 (May 9, 2019).

which point the poles are brought in section-by-section and then erected by crane.[257] Construction of taller poles may also require "helicopters to pull the lead line and conductors through the blocks,"[258] adding the variable of flight safety and restrictions to an already complex process.

Mr. Paquette confirmed that once a concrete caisson foundation is required, "similar types of impacts [to undergrounding]" would occur based on the need for a substantial travel lane down the ROW.[259] Mr. Paquette describes the "biggest difference" as "the need for adequate access to allow concrete mixer trucks to access the structure locations" and explains that:

> Concrete foundations for this application are too large for pre-casting followed by site-specific transport. Therefore, to accomplish foundation construction along Segment 1, temporary roads within the ROW of sufficient durability to withstand extremely heavy concrete mixing trucks would need to be cleared, leveled, and stabilized, likely necessitating the use of extensive matting and perhaps the construction of new or re-enforcement of existing bridges. Ideally, existing roads (most likely logging roads) crossed by the ROW, spaced at approximately 1-mile intervals, would be available for use along Segment 1 to provide access to the ROW, as this will tend to minimize environmental impacts.[260]

After pouring the concrete in the ROW, the concrete equipment would need to be washed, creating water requirements and the need to control for concrete residue.[261] Though any construction travel lanes needed between poles structures (in some instances direct off-corridor and on-corridor access to structures is possible)[262] would be "recontour[ed] to match original grade to the extent practical and revegetated"[263] and not maintained as construction roads after the project is operational,[264] there would still be significant permanent environmental impacts from the massive concrete foundations and taller poles relative to direct-embedding "typical" poles.

In general, Group 3 believes taller poles are practicable and environmentally preferable only if used sparingly to address areas of very high concern. Group 3 does not have the

[257] *Id.* at 451:6–13.
[258] *Id.* at 287:4–5.
[259] *Id.* at 427:22–24.
[260] May 1, 2019 Pre-filed Supplemental Test. by Gil A. Paquette (Intervenor Group 3) at 3–4 (emphasis in original).
[261] Tr. 427:20–428:18 (May 9, 2019).
[262] *Id.* at 317:12–23.
[263] *Id.* at 316:15–17.
[264] *Id.* at 317:22–23.

environmental expertise to determine which areas are best-suited for taller poles. However, Group 3 offers the following recommended guidelines. First, the DEP should determine where taller vegetation would be allowed under CMP's existing proposal and whether such taller vegetation would suffice to meet the applicable standards. Second, the DEP should determine where structures can be adjusted to create an environmental benefit with minimal modifications, e.g., slightly taller standard poles or use of guy wires, and without the need for concrete foundations. Third, the DEP should determine where concrete foundations may provide environmental or visual benefits without the need for taller, custom poles. Fourth, after considering the cumulative environmental benefits of all other options, the DEP should consider taller poles with concrete foundations only in areas where there might be unreasonable impacts otherwise, and those impacts could be mitigated despite the significant construction impacts and permanent visual and environmental impacts associated with taller poles and concrete foundations.

E. The Tapering Alternative

Tapering refers to a means of vegetation management within the ROW. "Visual tapering allows vegetation to grow taller towards the corridor edges, [whereas] tapering for wildlife travel corridors allows vegetation to grow taller toward transmission structures."[265] Tapering for wildlife travel corridors is also known as "linear tapering"[266] or "corridor tapering."[267]

In general, visual tapering would consist of three 16-foot-wide tiers of vegetation extending from the wire zone to the ROW edge on either side of the conductors.[268] Under the wire zone, vegetation would be maintained as ten-foot scrub/shrub. Extending toward the ROW edge, vegetation would be maintained at 15 feet, 25 feet, and then 35 feet in each of the 16-foot tiers.[269]

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[265] Tr. 242:8–12 (May 9, 2019).
[266] *Id.* at 322:1–8.
[267] *Id.* at 326:20–327: 2.
[268] *Id.* at 284:17–285:5.
[269] *Id.* at 284:17–285:5.

Visual tapering reduces the visual impact of the corridor by “soften[ing] the edges of … the corridor.”[270] Visual tapering “works best when you're up above looking down from a viewer superior position”[271] or “when you're looking right down the line.”[272] When “the line is screen[ed] running perpendicular to the viewpoint” tapering has minimal effect.[273] Visual tapering also provides habitat within the ROW and increases connectivity between habitats on either side of the ROW, both decreasing alleged fragmentation effect.[274]

Corridor tapering occurs between pole structures and is primarily intended to facilitate wildlife connectivity. For example:

> In the Upper Kennebec deer wintering area where eight deer winter travel corridors will be created and maintained trees, primarily softwoods, will be allowed to grow heights ranging from 25 to 35 feet depending on adjacent structure height, conductor sag and topography. In these travel corridors, trees will generally be shorter near mid-span and taller near structures.[275]

The width of corridor tapering varies, with the eight proposed corridors totaling “around a mile” and each corridor “on the order of hundreds of feet at least.”[276] Both types of tapering assume flat terrain. However, where conditions allow, taller trees could be retained and maintained in such state.

Several parties agree that tapering provides some, but limited, environmental and visual benefits. Dr. Publicover states “[tapering] could have some limited benefit in reducing edge effects by reducing the penetration of light and wind into the adjacent forest.”[277] Mr. Reardon states “is there some limited benefit? Yes.”[278] But Dr. Calhoun could not say whether tapering would “reduce the impacts to all vernal pools not just significant vernal pools”[279] Mr. DeWan concluded

[270] Tr. 144:15–16 (Day Session, Apr. 2, 2019).
[271] *Id.* at 48:18–20.
[272] Tr. 340:17–18 (Apr. 1, 2019).
[273] *Id.* at 340:20–22.
[274] Tr. 238:2–239:14 (May 9, 2019).
[275] *Id.* at 243:9–16.
[276] *Id.* at 256:7–13.
[277] *Id.* at 77:10–13.
[278] *Id.* at 83:3.
[279] *Id.* at 52:18–53:8.

that "to the [extent] that additional tapering or taller transmission structures are being evaluated for . . . environmental considerations tapering would be preferable to taller transmission poles because of the potential for greater visual impacts associated with the taller structures."[280] Ms. Segal concluded that "[t]apering would have visual benefits in very limited areas . . . such as . . . along Rock Pond access road or Whipple Brook, Spencer Rips Road."[281] Moreover, "[c]onsultation with the MDIFW, the resource agency experts in Maine on these subjects, resulted in the recommendation for … tapering only in those areas included in CMP's Compensation Plan."[282] "[C]onsultation between CMP and IF&W did not indicate that such tapering was necessary or that the removal of full height forest canopy in riparian buffers across 150 foot wide right of way would be unreasonable or would create an adverse effect through the loss of woody debris input into stream channels."[283]

Despite being relatively easier than implementing full-height vegetation, tapering still would be costly and logistically complex. Tapered vegetation is "a paradigm where it requires the very intensive, consistent intervention."[284] Tapered trees ranging from 15 to 35 feet tall "would be managed by crews on foot from the ground and cut back to ground level by mechanical means, primarily chainsaws."[285] "Vegetation management for tapering would be extremely labor-intensive and expensive, requiring the visibility of tree tops and the gauging of tree heights relative to the conductor safety zone within tapered areas in order to selectively target and remove individual specimens that were already within the conductor safety zone, or were anticipated to grow into the conductor safety zone prior to the next scheduled maintenance cycle."[286] After

[280] *Id.* at 154:10–16.
[281] *Id.* at 165:16–18.
[282] May 1, 2019 Pre-filed Supplemental Test. by Mark Goodwin (CMP) at 4.
[283] Tr. 234:21–235:2 (May 9, 2019).
[284] *Id.* at 306:4–5.
[285] May 1, 2019 Pre-filed Supplemental Test. by Gerry J. Mirabile (CMP) at 5.
[286] *Id.*

cutting, trees would need to be removed. "Tree removal may be challenging due to close spacing of trees and dense growth."[287] Due to poor visibility and/or access, there is increased risk of tree intrusion into the conductor safety zone.[288] For a transmission line of NECEC's voltage, the current can flashover or arc to vegetation that is nearly 15 feet away and not actually touching the conductor.[289] Further, coppicing would be widespread without reliance on systemic herbicides, which creates the need for additional mechanical maintenance.[290] Because of "the less reliable and less certain control of woody vegetation in tapered areas, mechanical vegetation management in tapered areas would be conducted on a two-or three-year cycle, rather than a four-year cycle."[291]

Given its minimal benefits but significantly increased cost and relatively more complex logistics, extensive use of tapering throughout Segment 1 would be impracticable. However, tapering in discrete, highly sensitive areas could provide sufficient incremental environmental benefits to justify its use. This is especially true where visual and corridor tapering could be combined[292] and optimized to provide the greatest environmental benefit for the least cost, for example, near areas where mature forest would be maintained in a mature state on either side of the ROW for the duration of NECEC's operation.

3. LUPC ALTERNATIVES ANALYSIS

A. The Legal Standard

Within a P-RR subdistrict, a utility facility is allowed by special exception if the LUPC finds, *inter alia*, that an applicant has shown by substantial evidence that there is no alternative site which is both suitable to the proposed use and reasonably available to the applicant.[293] In a

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[287] Tr. 245:1–2 (May 9, 2019).
[288] May 1, 2019 Pre-filed Supplemental Test. by Gerry J. Mirabile (CMP) at 6.
[289] Tr. 486:7–22 (May 9, 2019).
[290] *Id.* at 245:1–6.
[291] May 1, 2019 Pre-filed Supplemental Test. by Gerry J. Mirabile (CMP) at 6.
[292] Tr. 322:12–17 (May 9, 2019).
[293] *Land Use Districts and Standards*, 01-672 C.M.R. 10 (Chapter 10), section 10.23,I,3.d

recent certification concerning an identical special exception provision, the Commission held "that there is no alternative site which is both suitable to the proposed use and reasonably available to the applicant" because "it is unlikely that a different site with the combination of factors required for this project could be found that would not be similarly impacted by the presence of wetlands."[294] The proposed site was selected "for a number of factors, including proximity to a major transportation corridor, direct access to electric transmission lines, and proximity to complementary uses."[295] Suitability and reasonable availability thus require an alternative site to both meet the applicant's basic site-selection criteria and confer environmental benefits, in terms of fewer of the same impacts or different impacts that result in less overall environmental harm, relative to the proposed site. In this case, CMP has demonstrated that there are no alternative sites to the three P-RR subdistricts crossed by NECEC.

B. Kennebec River Crossing

NECEC does not pass within the P-RR subdistrict associated with the Kennebec River, which extends 250 feet from the normal high-water mark on both sides of the river.[296] CMP amended the Project[297] "to cross beneath the upper Kennebec River . . . utilizing horizontal directional drilling (HDD) rather than an overhead crossing, to eliminate visible conductors and structures from the Kennebec River and to maintain this river segment's scenic and recreational values."[298] Undergrounding requires a termination station on either side of the Kennebec River, "sited and designed to be buffered by existing vegetation and topography and therefore invisible to river users."[299] The termination stations are located outside of the P-RR subdistrict.[300] The

[294] Dep't of Env't Prot., Site Law Certification SLC-5 ¶ 10 (emphasis added).
[295] *Id.*
[296] Feb. 28, 2019 Pre-filed Direct Test. of Brian Berube (CMP) at 14.
[297] Feb. 28, 2019 Pre-filed Direct Test. of Gerry J. Mirabile (CMP) at 8.
[298] *Id.* at 5 (emphasis added).
[299] *Id.* at 8.
[300] Feb. 28, 2019 Pre-filed Direct Test. of Brian Berube (CMP) at 14.

buffers used to shield the termination stations, each extending over 1,150 feet from the river bank, will not be disturbed or maintained, with trees allowed to grow to their full height.[301] Because NECEC will not be visible from or create impacts within the P-RR subdistrict, there is no alternative site both suitable and reasonably available, i.e., that would meet CMP's basic site-selection criteria and confer environmental benefits relative to the proposed HDD crossing.

C. Beattie Pond

There is no alternative site that is both suitable and reasonably available, i.e., that would meet CMP's basic site-selection criteria and confer environmental benefits relative to the proposed configuration of NECEC near Beattie Pond. CMP first attempted to negotiate alternative alignments for NECEC that would utilize sites outside of the P-RR subdistrict. A southern alignment failed because, after offering a landowner between 150 and 200% of fair market value for a parcel of land, the landowner "demanded almost 50 times fair market value."[302] Such a site is not reasonably available to CMP. A northern alignment was rejected because it would have lengthened the route, required more clearing, and potentially led to increased visibility from Beattie Pond.[303] Without conferring environmental benefits relative to the current configuration, such a site is not suitable for NECEC or reasonably available to CMP.

CMP then modified its original proposal, at the request of LUPC staff, to reduce the height of the one structure that would have been visible from Beattie Pond.[304] An angle structure was re-engineered to reduce its height by about 39 feet, such that existing vegetation will buffer all but the top of the self-weathering steel structure.[305] Thus, CMP has effectively minimized visual and recreational impacts of NECEC from Beattie Pond. While not an alternative "site" per se, this

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[301] Feb. 28, 2019 Pre-filed Direct Test. of Gerry J. Mirabile (CMP) at 8.
[302] Feb. 28, 2019 Pre-filed Direct Test. of Gerry J. Mirabile (CMP) at 21.
[303] *Id.* at 21–22.
[304] *Id.* at 7.
[305] Feb. 28, 2019 Pre-filed Direct Test. of Amy Bell Segal (CMP) at 32.

modification demonstrates CMP's willingness to reduce the impacts of NECEC in a manner consistent with LUPC staff's apparent belief that modification rather than re-location is sufficient for the P-RR subdistrict containing Beattie Pond. In other words, because CMP's proposed modification would result in hardly any impact within the P-RR, any alternative site would provide few, if any, environmental benefits, and thus is not reasonably available to CMP, especially if significantly more expensive.

Other forms of modification, such as undergrounding, are impracticable for the general reasons set forth above in sections (2)(B)(i-iv), as well as reasons specific to Beattie Pond. Undergrounding at Beattie Pond would require "installing termination stations just outside of the P-RR subdistrict and connecting them with approximately 1.2 miles of direct buried cables, including three jointing locations" as well as crossing two sets of wetlands "by approximately 1,000-foot long HDD installations."[306] Construction "would require clearing and continuous surface disruption in the P-RR subdistrict" and cost an incremental $13.2 million. Additionally, as explained above in section (2)(B)(iii), undergrounding would cause logistical issues associated with maintaining reliability. Thus, undergrounding at Beattie Pond is not practicable or environmentally beneficial, especially in light of CMP's proposed modification that would minimize impacts.

D. The Appalachian Trail

There is no alternative site that is both suitable and reasonable available, i.e., that would meet CMP's basic site-selection criteria and confer environmental benefits relative to the proposed configuration of NECEC near the AT. The AT crosses CMP's existing 115-kV transmission corridor three times in a 3,500-foot section, within a 200-foot P-RR subdistrict.[307] NECEC would

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[306] Mar. 25, 2019 Pre-filed Rebuttal Test. of Justin Bardwell (CMP) at 19.
[307] Feb. 28, 2019 Pre-filed Direct Test. of Amy Bell Segal (CMP) at 33.

be co-located within the existing corridor. Re-locating NECEC is neither suitable nor reasonably available because it would require the creation of new transmission corridor crossing the AT. Co-location, on the other hand, in addition to minimizing environmental and visual impacts, is particularly suitable and available to CMP by virtue of the easement that CMP granted to the NPS, which both permits the existence of the AT (and thus facilitates hiking) and reserves to CMP the right to construct an additional overhead transmission line (and thus facilitates overhead transmission). Undergrounding at the AT is also impracticable, and not suitable or reasonably available to CMP, for the general reasons set forth above in sections (2)(B)(i-iv), as well as the specific reasons set forth above in section (2)(C)(ii).

4. CONCLUSION

The NRPA seeks to protect the environment from humans, but it does so for uniquely human reasons. The Legislature recognized that human "uses" are degrading critical resources, "producing significant adverse economic and environmental impacts and threatening the health, safety and general welfare of the citizens of the State."[308] In addition to "environmental value," critical resources have exclusively human values in the form of "scenic beauty" and "recreational, cultural, [and] historical … value of present and future benefit to the citizens of the State."[309] Thus, the NRPA embodies an inherent tension between humans and the natural environmental within which we live. To deal with this tension, the Legislature determined that "[t]he well-being of the citizens of this State requires the development and maintenance of an efficient system of administering this article to minimize delays and difficulties in evaluating alterations of these resource areas."[310] The DEP's mission is not to stop human development; it "shall grant a permit

[308] 38 M.R.S. § 480-A.
[309] 38 M.R.S. § 480-A (emphasis added).
[310] *Id.* (emphasis added).

when it finds … the proposed activity meets the standards."[311] Those standards are matters of reasonableness, requiring the balancing of costs and benefits. Benefits need not be exclusively environmental, as Maine's economy and the health, safety and, general welfare of its citizens, as well, are essential reasons for protecting Maine's resources.[312]

Through this lens, the regulatory rejection machine advocated by Project opponents starkly contrasts with the purposes of the NRPA. Their alternatives arguments maximize rather than "minimize delays and difficulties in evaluating alterations." In the context of the NRPA, an alternatives analysis should be focused on finding different and better ways to achieve the objective of a project, not slower and more complicated ways to suffocate it. That is especially true for a project like NECEC, which is effectively a project to protect humans from humans by mitigating climate change and avoiding an officially acknowledged, impending energy crisis in New England. It is irrelevant that CMP requires and will earn a profit; no non-profit organization has proposed, or will propose, a similar project that will transform the energy paradigm in New England by lowering costs, displacing fossil fuels, mitigating grid reliability concerns and "fuel security" risk, and facilitating the integration of additional renewable energy, while at the same time providing a significant in-state economic stimulus.

[311] 38 M.R.S. § 480-D.

[312] Group 3 is using the NRPA as an example but notes that the Site Law similarly is premised on protecting "the economic and social well-being of the citizens of the State of Maine" and based upon standards of reasonableness. 38 M.R.S. § 481. The Site Law's express purpose is "to provide a flexible and practical means by which the State, acting through the department, in consultation with appropriate state agencies, may exercise the police power of the State to control the location of those developments substantially affecting local environment in order to insure that such developments will be located in a manner which will have a minimal adverse impact on the natural environment within the development sites and of their surroundings and protect the health, safety and general welfare of the people." 38 M.R.S. § 481.

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Respectfully submitted,
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