Section 2. PROJECT ALTERNATIVES ANALYSES

Downeast Wind, LLC (the Applicant) extensively evaluated alternatives for the Downeast Wind Project (the Project). Section 2.1 describes the Project purpose and need and the following sections describe why the Project cannot be completed by:

- Utilizing, managing or expanding one or more other sites that would avoid resource impact. These Project Siting Alternatives are described in Section 2.2.
- Reducing the size, scope, configuration, or density of the activity as proposed, thereby avoiding or minimizing the resource impact. These Project Reduction Alternatives are described in Section 2.3.
- Developing alternative activity designs, such as cluster development, that avoid or lessen the resource impact. The Project Impact Avoidance and Minimization alternatives are described in Section 2.4.

Section 2.5 summarizes the reasons that no practicable alternatives to the proposed Project and its associated resource alterations exist, and that the currently proposed Project is the Least Environmentally Damaging Practicable Alternative (LEDPA).

2.1. PROJECT PURPOSE AND NEED

The purpose and need for the Downeast Wind Project is to serve growing regional demand for electricity in a manner consistent with regional and state of Maine energy policy,[2] which among other things, calls for an increase in renewable energy sources that will reduce reliance on sources of emissions of greenhouse gases. In addition, the Project's purpose and need is consistent with the energy goals and objectives of the Land Use Planning Commission's (LUPC's) Comprehensive Land Use Plan (CLUP), which expressly states that its policy is to "support indigenous, renewable energy resources as part of state and national efforts to promote energy independence, diversity and long-term sustainability." The State of Maine has indicated the desire to facilitate and encourage the development of wind energy by passing the Wind Energy Act, 35-A M.R.S.A. Chapter 34-A. Section 3404.1, which states,

> It is the policy of the State in furtherance of the goals established in subsection 2, to encourage the attraction of appropriately sited development related to wind energy, including any additional transmission and other energy infrastructure needed to transport additional offshore wind energy to market, consistent with all state environmental standards; the permitting and financing of wind energy projects; and the siting, permitting, financing and construction of wind energy research and manufacturing facilities.

Subsection 2, referenced above, spells out the State goals with respect to wind energy development:

> 2. State wind energy generation goals. The goals for wind energy development in the State are that there be:

[2]An Act to Provide Leadership in Addressing the Threat of Climate Change, 2003; An Act to Enhance Maine's Energy Independence and Security, 2005; Act to Establish the Regional Greenhouse Gas Initiative, 2007; Electrical Restructuring Act, 35 M.R.S.A. Section 3210, 1997, et seq.; and the Wind Energy Act, 35-A M.R.S.A. Chapter 34-A, 2008.

> A. At least 2,000 megawatts of installed capacity by 2015; [PL 2009, c. 615, Pt. A, §4 (AMD).]
>
> B. At least 3,000 megawatts of installed capacity by 2020, including 300 megawatts or more from generation facilities located in coastal waters, as defined by Title 12, section 6001, subsection 6, or in proximate federal waters; and [PL 2009, c. 615, Pt. A, §4 (AMD).]
>
> C. At least 8,000 megawatts of installed capacity by 2030, including 5,000 megawatts from generation facilities located in coastal waters, as defined by Title 12, Section 6001, subsection 6, or in proximate federal waters. [PL 2009, c. 615, Pt. A, §4 (NEW).]

To date, none of these State goals have been achieved, with just shy of 1,000 MW of capacity installed through 2020.

Maine's renewable energy goals also reflect a desire within the State to encourage the generation of electricity from renewable sources, with passage of and continuing updates to the state's Electrical Restructuring Act, 35 M.R.S.A. Section 3210. The goals in this section of legislation included in subsection 1-A:

> State goals for consumption of electricity from renewable resources:
>
> - By January 1, 2030, 80% of retail sales electricity in the State will come from renewable resources; and
> - By January 1, 2050, 100% of retail sales electricity in the State will come from renewable resources.

This proposed project will support both these goals by providing additional wind energy development and indigenous renewable energy.

In recognition of the above policies and planning objectives, the purpose and need for the Project includes developing an economically feasible utility-scale wind energy project that both takes advantage of the excellent wind resource found in eastern Maine and provides much-needed economic benefits to the local community.

Because of the increasing regional energy demand, established State of Maine energy policy, and LUPC's CLUP objectives, a "no action" alternative was rejected as being inconsistent with the Project purpose, which includes advancing state and regional energy policy objectives.

2.2. PROJECT SITING ALTERNATIVES

Downeast Wind considered and evaluated numerous locations during the siting phase of the Project. During the site selection process, the following criteria were evaluated with the objective of developing an economically feasible utility-scale wind power project:

- Quality of wind resource, based on best available wind data;
- Electric transmission access and capacity, including consideration of alternative interconnection routes;

- Land ownership, including size of contiguous tracts, number of landowners, and compatibility with present land uses;
- Construction-related feasibility and costs (evaluations of soils and geology, topography, and existing infrastructure);
- Site viability, including consideration of potential impacts to wildlife and water resources; and
- Community support.

2.2.1. OFFSHORE ALTERNATIVE

Offshore winds along the New England coast are strong and consistent in many places. However, current technology for offshore development is in its early stages. Further, offshore projects have not yet gained widespread public or regulatory acceptance in New England. In Maine, the Governor recently proposed a ten-year moratorium on offshore wind power projects in State waters.[3] Therefore, offshore wind alternatives were not pursued as they were deemed to be neither available nor practicable with respect to meeting the Project's purpose and need.

2.2.2. NEW ENGLAND ALTERNATIVES

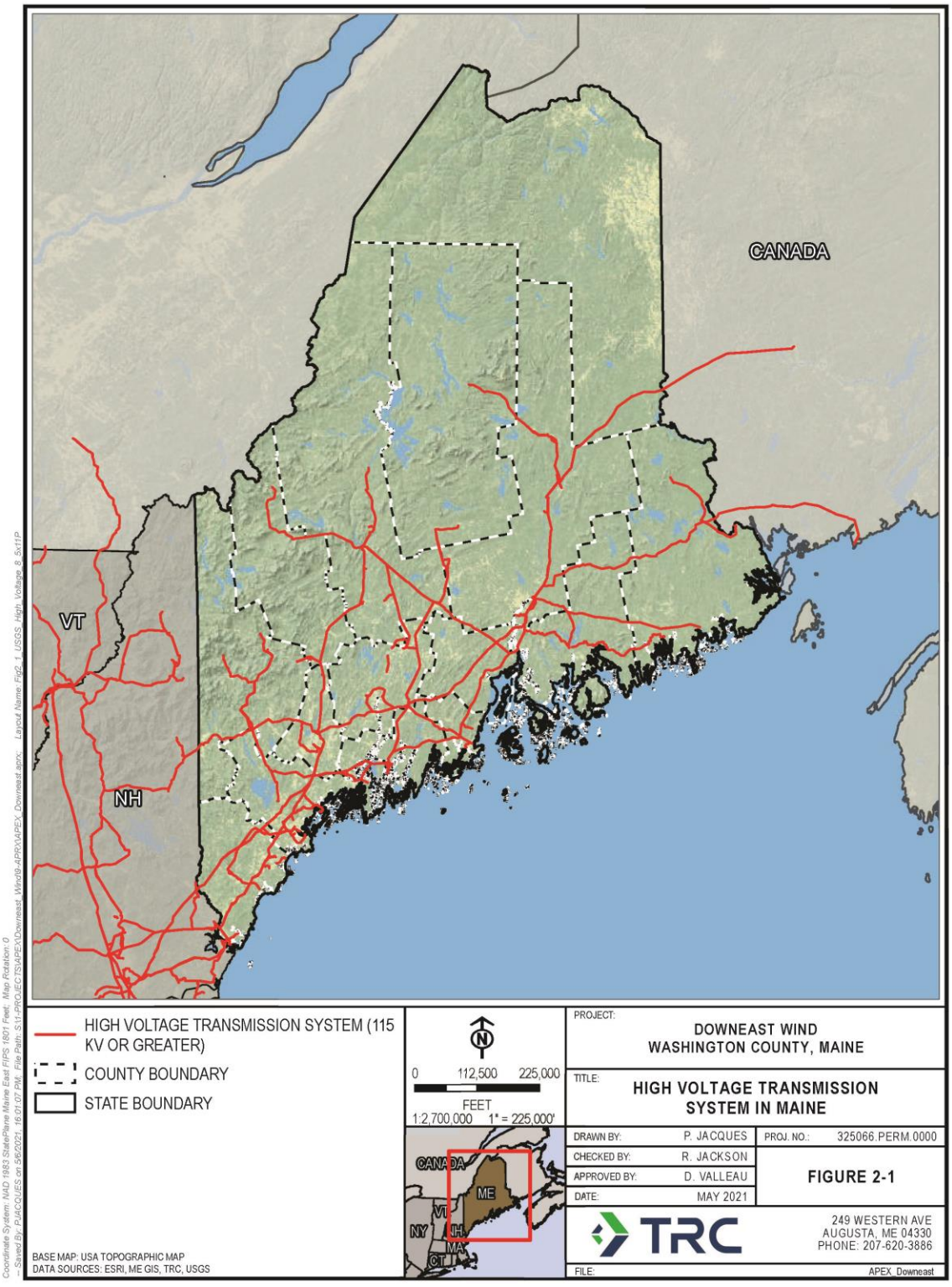
The highest quality onshore (inland) wind resources in New England are typically found in the mountainous regions. Within New England, economically viable onshore winds are primarily found in the northwest portion of Maine between the Mahoosuc Mountain Range in Oxford County and Mt. Katahdin in Piscataquis County, making the area suitable for reliable wind energy development from a wind resource perspective. However, the transmission infrastructure required for new onshore wind projects is lacking in these areas. The lack of transmission infrastructure has been a perennial issue for siting wind projects in Maine. The Maine legislature has considered the issue of transmission infrastructure constraints on renewable energy development, and a 2019 piece in the *Kennebec Journal* and *Morning Sentinel* detailed the lack of transmission as an impediment to wind power project siting, arguing that 5 large wind projects, promising 2,034 megawatts of clean energy, failed for want of sufficient transmission infrastructure.[4] A review of existing high-voltage electric infrastructure (115kV or greater), which is necessary to connect wind power projects to the grid, is also illustrative of the scarcity of potential interconnection points in western and northern Maine. Figure 2-1 depicts the existing high voltage transmission system in Maine.

2.2.3. MAINE REGIONAL ALTERNATIVES

Aroostook County has extensive open land that would be suitable for wind energy development but is likewise lacking necessary transmission infrastructure. See Figure 2-1, which indicates there is no high-voltage electric transmission existing in the majority of Aroostook County. Even

[3] http://www.mainelegislature.org/legis/bills/display_ps.asp?ld=1619&PID=1456&snum=130#
[4] https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/LD1401_Transmission_Renewable_Energy%20Study_Stakeholder%20Report.pdf; https://www.centralmaine.com/2019/07/25/transmission-deficit-is-holding-back-wind-in-maine/

Figure 2-1. High Voltage Transmission System in Maine



in areas with strong winds and proximity to transmission lines, the availability of large accessible tracts of private land on which to erect and maintain wind turbines is severely limited, even in a largely forested state like Maine. Conservation areas cover a significant amount of the mountains of northwestern Maine, eliminating many potential sites from ever being developed as wind projects. Topography, severe slopes, bedrock geology, soils, and other construction restrictions must also be taken into consideration in assessing a potential site for wind project development. Severe slopes make construction difficult or impossible and extremely expensive. Crossing ridgelines for electric transmission access makes more remote sites economically infeasible as commercial wind projects.

Downeast Wind identified eastern Maine as a potential area to investigate further for potential wind energy project development due to: the availability of a strong wind resource; potential availability of land; reasonable proximity to the transmission grid and capacity to accommodate a grid-scale project; increasing regional demand for electricity; and strong policy support for renewable energy.

2.2.4. EASTERN MAINE SITE SELECTION PROCESS

Once Downeast Wind made the decision to evaluate sites in the eastern Maine region, the following criteria were used to narrow down the site for the proposed Project.

Quality of Wind Resource: The single most important criterion for siting a viable grid-scale wind project is the wind resource. Downeast Wind has been evaluating meteorological data from the Project site since 2015 with multiple meteorological towers. Preliminary capacity and energy estimates were developed with favorable results and a strategy was outlined for collecting additional data. In 2019, additional meteorological towers were installed to further characterize and evaluate the wind resource. The local wind conditions at the Project site have been measured as a Class 3 resource, which is considered economically viable utilizing modern, tall, and more efficient wind turbines. The Applicant evaluated not only wind strength but important project viability factors such as persistence and consistency, concluding that the Downeast Wind Project site is a viable wind resource, which will enable the Project to produce enough electricity annually to power approximately 38,000 homes.

Transmission Access and Capacity: Proximity and access to the regional transmission system with capacity to accommodate new generation is a critical consideration in siting a wind energy project. Downeast Wind focused its site selection process on identifying sites that did not require new electric transmission lines and where the existing transmission infrastructure had existing capacity to accommodate new generation, as these sites would be the least environmentally damaging and most technically and economically feasible.

Land Ownership: Availability of large tracts of land that can accommodate both the siting of grid-scale wind turbines and the required separation distances between turbines needed to optimize efficient wind use for power production are rare. Once tracts meeting the site criteria were located, land ownership was evaluated with the Applicant selecting a site with a small number of landowners willing to consider leasing land for a wind project. The Downeast Wind Project site has the added benefit of being owned primarily by one landowner. In addition, the siting of a wind project is compatible with the primary land use, wild blueberry production.

Construction Feasibility: During the early stage of siting, Downeast Wind performed a formal evaluation of engineering feasibility, including anticipated construction and operation costs. During the summer of 2019, Downeast Wind engineering staff performed an additional on-site

engineering feasibility review, evaluating construction and operations access, condition of existing roads, soils, topography and general landscape conditions. The Applicant retained James W. Sewall Company to prepare a civil engineering design of the Project layout including access roads, crane paths, and turbine pads based on natural resource data (wetlands, streams, vernal pools, mapped fish and wildlife habitats, rare species), two-foot contours, and utilizing existing well-maintained access roads to the extent practical.

Site Viability: Downeast Wind performed extensive site constraints analyses based on the best available information (including visual, recreational, cultural and environmental), and held meetings with key stakeholders. The detailed review that was conducted and discussions with stakeholders indicated the viability of the project at the proposed site, and the desire within Maine for development of wind power projects. In addition, site reconnaissance was conducted by key project personnel to ground truth information identified through file review. Site specific surveys have been conducted for grassland birds, nocturnal avian migrants, bats, daytime avian migrants, eagle use, eagle nesting, heron rookeries, breeding birds, wood turtle habitat, vernal pools, wetlands, stream assessment, botanical resources, dwellings, archaeological and historical resources, and soils. Assessments for visual, shadow flicker, and noise have also been performed. Turbine visibility has been an issue in the siting of projects in New England and there will be limited visibility of the Project from statutorily defined scenic resources of state or national significance.

Community Support: Downeast Wind also conducted extensive outreach with stakeholders in Columbia and Washington County host communities. Working with host-community stakeholders, the Applicant developed an economic benefits plan supported by stakeholders and the local community including property tax payments resulting from Project development (TIFs), payments under community benefits agreements, local purchase of materials, local employment during operations and maintenance, reduced property taxes, reduced electrical rates, and land conservation. The Columbia board of selectmen, Washington County commissioners, Sunrise County Economic Council, and the Maine legislative delegation representing Washington County have all affirmed that the Project, as designed, represents numerous net benefits for local communities, the state, and the region.

These analyses support the selection of the Project site as a location that offers a viable wind resource, has onsite electric transmission connectivity, landowner support, demonstrated engineering and construction feasibility, reasonable environmental constraints with mitigation potential, community support and demonstrated community benefits, and alignment with local, state, and national policy objectives for developing renewable energy resources.

2.3. PROJECT ALTERNATIVES

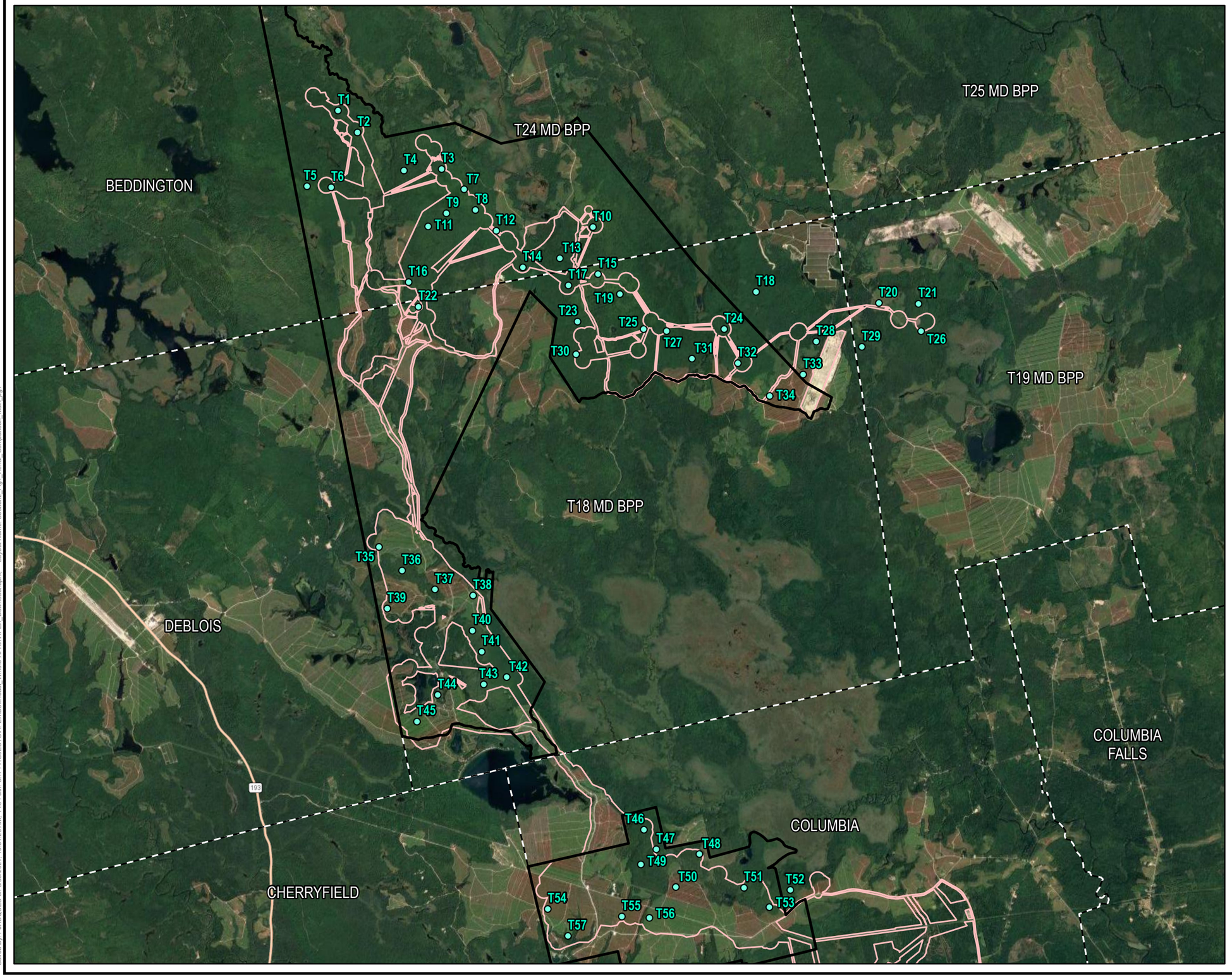
Downeast Wind continually adjusted and redesigned the proposed Project layout with the objective of avoiding and minimizing impacts to protected resources and land uses. The original Project proposal consisted of up to 57 turbines, with a goal of generating approximately 200 megawatts (MW) of electric power. State and federal jurisdictional wetlands and waterbodies were delineated, and significant wildlife habitats were mapped on over 6,266 acres of land in an effort to inform the engineering design. The Applicant evaluated 39 iterations of the Project engineering design and layout, reducing the Project from 57 turbines producing 200 MWs of electric power to 30 turbines producing 126 MWs of power, with the objective of avoiding and minimizing impacts to protected resources. In response to landowner collaboration, local community feedback, and MDIFW concerns over impacts to habitat for the state-listed endangered upland sandpiper, the

Project was reduced to 30 turbines and 126 MW in generation capacity. The reduction in turbines also corresponds with reduction from 25 turbines originally sited within barren habitat to only three turbines in or near to barren habitat, only one of which is in upland sandpiper habitat in the final layout. A figure that depicts the Project survey area and alternative turbine layouts is included as Figure 2-2.

Alternative 1, No-Action: Under the "no action" alternative, Downeast Wind would not pursue construction of the Project. The Applicant's primary mission and business is development of renewable energy projects to speed the shift to clean electricity. The "no action" alternative would not meet Project purpose to generate renewable energy and would not support the regional and state energy policies. As such, the "no action" alternative was rejected as it did not meet the basic Project purpose.

Alternative 2, 57 Turbine Layout: The original Project concept included area in the towns of Cherryfield, Columbia, and T18 MD BPP (see Figure 2-2, Page 1). Cherryfield changed its siting ordinance to increase the size of property line setbacks. This had the effect of reducing the area available for turbine siting. In order to find additional buildable area, the Project siting work moved east and north. Field investigations in this area indicated that wetlands constrained Project siting. Potential land area for the Project then shifted further north into T18 MD BPP and T24 MD BPP. Much of the siting work of this stage also included locations within blueberry fields. Consultation with MDIFW and landowners indicated that the potential for conflicts with upland sandpiper habitat and imposition upon commercial blueberry operations created additional constraints that made a 57-turbine layout difficult to design without significant impacts to wetlands, streams, upland sandpiper habitats and farming operations.

Alternative 3, 30 Turbine Layout, Proposed Project: This approach minimizes wetland and other habitat impacts, is cost effective, and meets the purpose of the Project (see Figure 2-2, Page 2). Since the spring of 2019 and early constraints analysis work performed by Downeast Wind, turbine locations have been withdrawn from areas south of Baseline Road in Columbia and Cherryfield, from T19 MD BPP, and eastern portions of the Project in T24 MD BPP. Turbines were also removed from the Thousand Hills area, reducing the number in that area from nine to six. Visibility of turbines from Schoodic Lake was also considered, and the closest turbine locations were either removed or shifted further from the lake. While turbine locations were being shifted and reduced in number, the corresponding amount of access road, crane path, and electric collector line needed was also reduced. The collector lines that remain in the Project were also assessed to reduce the potential for impacts to natural resources. Collection corridors have been shifted to avoid wetland impacts to the extent practicable, and where impacts were deemed unavoidable, horizontal directional bores will be performed.



PROJECT BOUNDARY
SURVEY AREA
TOWN BOUNDARY

LAYOUT 18 - 3/7/2018

WTG - L18

BASE MAP: GOOGLE IMAGERY
DATA SOURCES: ESRI, ME GIS, TRC, USGS

1:73,200
1" = 6,100'

0 6,100 12,200 FEET

PROJECT:
APEX
DOWNEAST WIND
WASHINGTON COUNTY, MAINE

TITLE:
DOWNEAST WIND LAYOUT COMPARISON

DRAWN BY:	P. JACQUES	PROJ. NO.:	325066.PERM.0000
CHECKED BY:	R. JACKSON	**SECTION 2**	
APPROVED BY:	D. VALLEAU	**FIGURE 2-1**	
DATE:	MARCH 2021	**PAGE 1 OF 2**	

TRC
249 WESTERN AVE
AUGUSTA, ME 04330
PHONE: 207-620-3886

FILE: APEX_Downeast

Coordinate System: NAD 1983 StatePlane Maine East FIPS 1801 Feet - Map Rotation: 0
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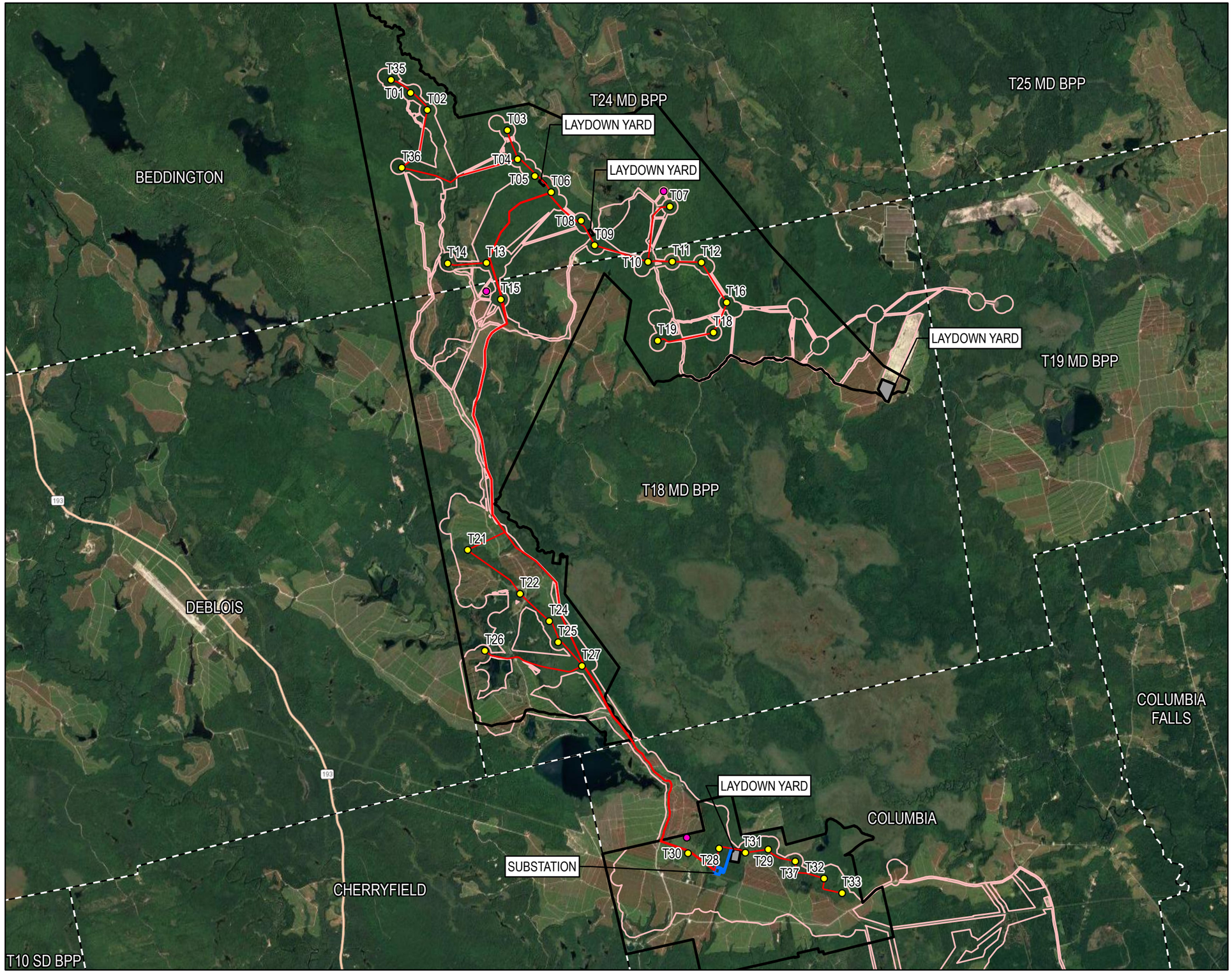
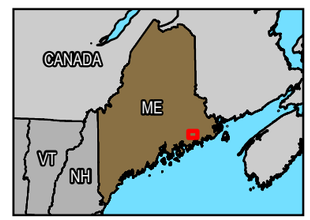


PROJECT BOUNDARY
SURVEY AREA
TOWN BOUNDARY

LAYOUT 39 - 3/12/2021

PROPOSED MET TOWER LOCATION
TURBINE LOCATION
COLLECTION LINE
LAYDOWN YARD
O&M FACILITY
SUBSTATION

BASE MAP: GOOGLE IMAGERY
DATA SOURCES: ESRI, ME GIS, TRC, USGS



1:73,200
1" = 6,100'

0 6,200 12,400 FEET

PROJECT:
APEX
DOWNEAST WIND
WASHINGTON COUNTY, MAINE

TITLE:
DOWNEAST WIND LAYOUT COMPARISON

DRAWN BY:	P. JACQUES	PROJ. NO.:	325066.PERM.0000
CHECKED BY:	R. JACKSON	**SECTION 2**	
APPROVED BY:	D. VALLEAU	**FIGURE 2-1**	
DATE:	MARCH 2021	**PAGE 2 OF 2**	

TRC
249 WESTERN AVE
AUGUSTA, ME 04330
PHONE: 207-620-3886

FILE: APEX_Downeast

Coordinate System: NAD 1983 StatePlane Maine East FIPS 1801 Feet; Map Rotation: 0
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2.4. IMPACT AVOIDANCE AND MINIMIZATION ALTERNATIVES

Engineering design has been implemented to site all Project facilities to avoid environmental resources to the greatest extent practicable. Creating the least impactful Project footprint has been a primary goal of the Project. Access road and crane path design takes advantage of the existing roadway network within the Project Area. Approximately one-half of the Project access road and crane path total lineal distance is comprised of existing roadways. This drastically reduced the amount of wetland, stream, and vernal pool habitat impacts. In areas where new roadways were required to access Project turbines, alignments were adjusted in order to either avoid protected resources in their entirety or to minimize impacts by designing crossings at the resource's narrowest practical locations or at the edge of a resource buffer area to decrease potential fragmentation and maximize the habitat and buffer areas.

Turbine pads have been individually designed and sited to avoid impacts to adjacent wetlands and, as a result, there are no impacts to wetlands from turbine pads. Electric collector lines have been sited to be co-located with roads to the extent possible. In some instances, collector lines have been routed cross-country to shorten the amount of collector corridor needed to connect the turbines with the substation. For those cross-country sections there are no permanent direct impacts to wetlands. Direct temporary impacts will be from construction mats for access over a limited number of wetlands and streams. Separate collector lines have also been consolidated into single corridors wherever possible. Another key project feature that has been incorporated into the Project design to avoid and minimize wetland impacts is routing the electric collector lines by horizontal directional boring under vernal pool, wetland, and stream resources.

Incorporating horizontal directional boring of the collector line into Project design has reduced impacts to streams by 9,609 square feet, wetland impacts by 167,798 square feet, vernal pool critical terrestrial habitat impacts by 71,819 square feet, and IWWH by 104,322 square feet. The only crossings of wetlands and streams that remain for the collections system are associated with upgrades to existing roads and temporary crossings to be utilized during Project construction. Please refer to Exhibit 1-2 for further detail.

2.5. LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE

Downeast Wind has selected a site that has the following characteristics:

- A Class 3 wind resource. The Applicant has studied the wind resources in the area for multiple years at multiple sites and has collected sufficient data to support the economics of siting the Project at this location.
- Electric transmission on-site with capacity to accommodate new generation and no need for new transmission line construction;
- A large land area available to provide for Project design flexibility to site turbines with adequate spacing and avoid environmental constraints;
- Compatibility with existing land uses;
- Condition of existing roads, soils, topography and general landscape conditions support construction of the Project.
- Visual, recreational, cultural, and environmental resources identified through extensive survey and assessment that are avoided and where impacts cannot be avoided they are minimized through layout design and/or construction methods; and

- Strong community support in the town of Columbia and in Washington County.

These characteristics support the conclusion that this site is the Least Environmentally Damaging Practicable Alternative (LEDPA).