Prepared for:	**Sample Customer** **Sample Company** **123 Main Street** **Anytown, MA 02362**
Subject Property:	**Lots X, Y, Z** **555 Evergreen Street** **Anytown, MA 023260**
Date:	**11/1/08**

Wind Energy Appraisal

Contents

1. Overview

This appraisal was performed to provide an initial evaluation of the potential to utilize wind energy to produce electricity at the subject location. It was undertaken at the request of XXXXXXXXX, who is the owner of the property.

The report provides an initial assessment of the suitability of the proposed site for one or more wind turbines. It is designed to provide the owner with enough basic information about the potential of a wind turbine at the site to allow them to make an educated decision as to the potential value of wind on the site, and as to whether or not further study, in the form of a full feasibility study, is warranted for this site.

While the report uses typical energy output values (KwHrs/yr) for various size wind turbines, it does not promote specific machines unless noted. It presents the various sizes of turbines as a guide to the owner in order to gage the potential revenue/savings of various sized turbine investments. While the report does depict a range of the potential value of the wind resource, it does not get into the detailed cost of various sized machines, nor does it present a complete cash flow analysis, both of which are usually covered in complete feasibility studies.

The appraisal uses published wind maps in order to determine its potential value as a wind power site. In many cases this information alone will be enough for the owner to make a decision. In other cases, especially if the winds are marginal, or if outside financing requires it, a more refined approach using powerful computer modeling or actual wind data collection efforts may be required. Computer modeling is often included in feasibility studies. If actual data collection is required, this process is typically initiated after the complete feasibility study is performed. In this manner the owner makes incrementally larger investments only when and if the previous work warrants it.

The report will also attempt to spotlight any broad “fatal flaws” which might preclude the owner from moving forward in considering this type of wind power project. While it takes a broad look at the zoning process, it does not get into the details of micro-siting or the permitting process. Again, these are typically found in the domain of a full feasibility study.

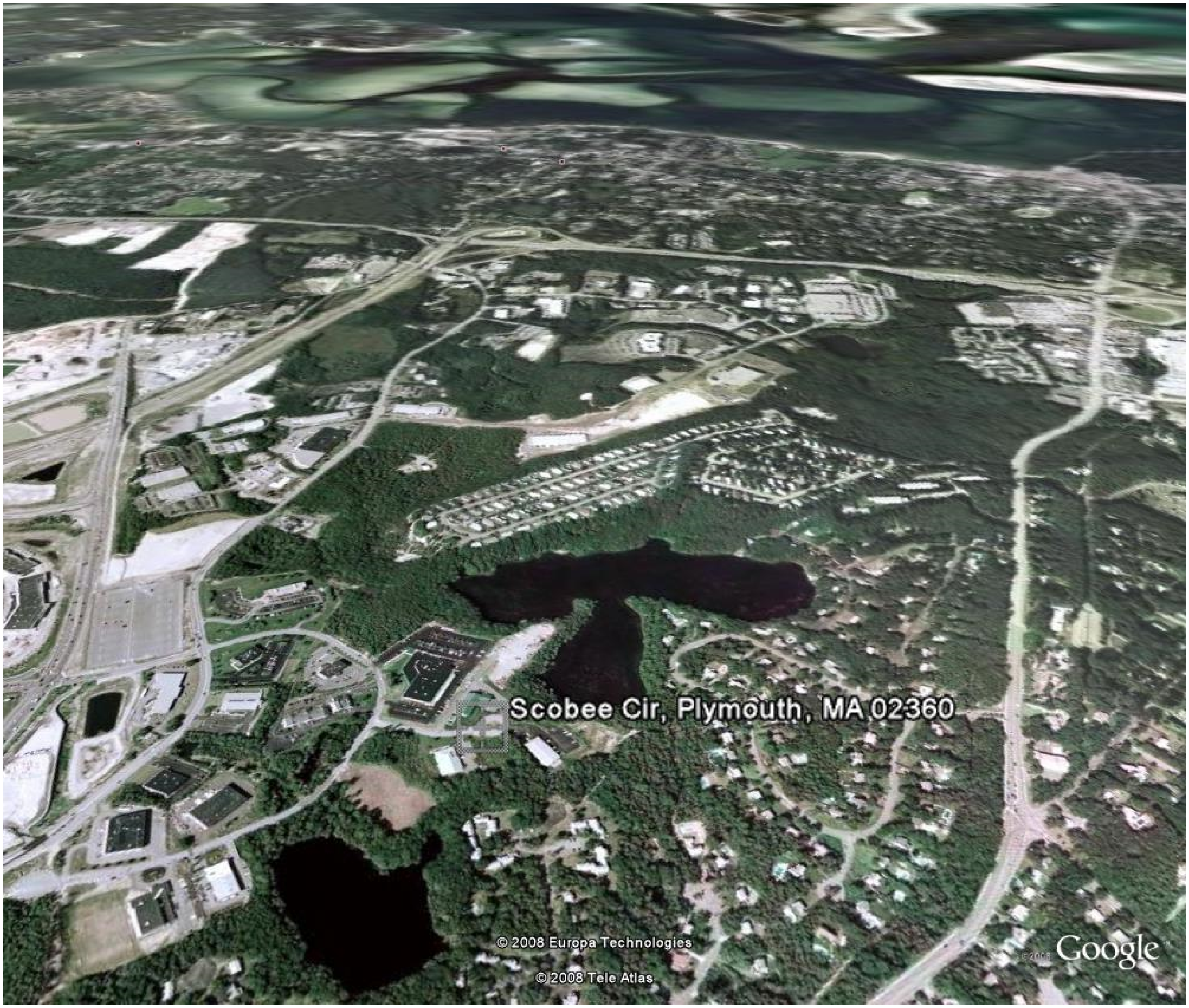
The appraisal concludes with some excellent consumer information published by many sources which the owner should find of value in considering this sort of energy project.

2. The Site

The property consists of two parcels, number XXXXX and XXXXXXXX, in an industrial park in *Anytown, MA*. A plot plan and assessors map is included for reference.

General observations:

1. The site is in close proximity to the ocean (2.2 miles).
2. It is zoned Industrial, but abuts residentially zoned land which in some cases lies within 500′ of a proposed turbine location
3. The site is surrounded by vegetation consisting of scrub oak and pine, of less than 35′ in height.
4. There are a number of areas in which a turbine may be located, some of which are approximately 20-30′ lower in elevation than others.
5. Much of the land is narrow in shape, with 2 broad areas. The existing building was placed in one of those areas, and the other is being used as a parking lot, with the hope of using it as a future 2nd building site. This may relegate any turbine locations to fringe areas of the property.


Scobee Cir, Plymouth, MA 02360
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Parcel Map

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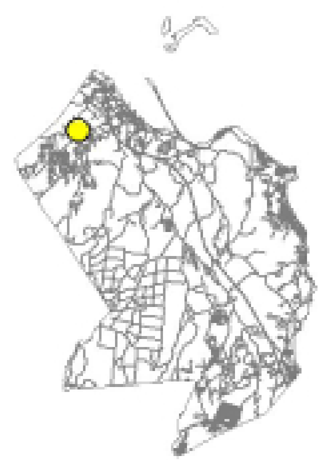
Map for Reference Only
NOT A LEGAL DOCUMENT

Because of different update schedules, current property assessments may not reflect recent changes to property boundaries. Check with the Board of Assessors to confirm boundaries used at time of assessment.

This map created by

Applied Geographics, Inc.



Parcel Map

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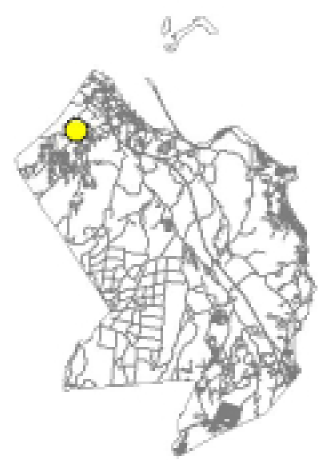

This map created by

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3. The Wind Resource

The site was located using AWS Truewinds Wind map data for New England (MTC) in order to estimate the potential wind resource. The data from the Wind Maps for this area of Plymouth has been documented and compared to known local met tower data from an MTC/UMass study done at Exit 5 on Route 3. Due to the similarity of topography, ground cover and distance from the ocean, it is reasonable to assume that the TrueWinds map data for this area is also valid to a high degree.

Average wind speeds will vary according to the height above ground. Because the power output of a wind turbine varies as the cube of the wind speed, a small amount of increased speed results in a substantial increase in power generation.

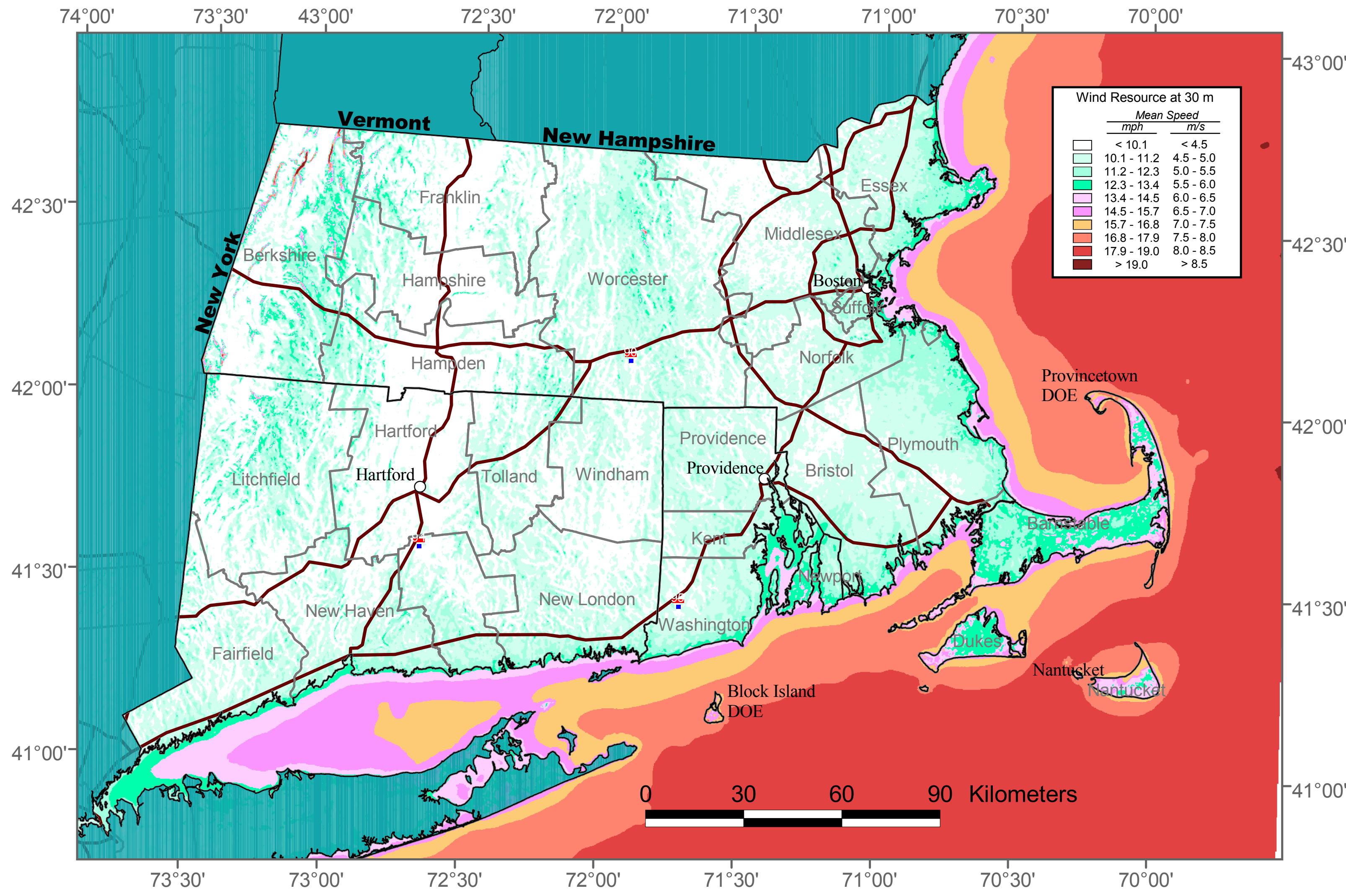
The estimated wind speed at this location at a few common rotor heights is:

Hub Height	Wind Speed m/s (mph)
30 meter (98 feet)	5.25 (11.5)
65 meter (213 feet)	6.25 (14.0)
100 meter (328 feet)	6.75 (15.1)

Table 1

This site is considered to be in an area of good wind of a commercial nature. However, wind is a fickle resource, and its actual measurements can vary greatly between sites that are just hundreds of yards apart. A micro-siting map should be consulted and implemented as part of any further study, especially given the local terrain.

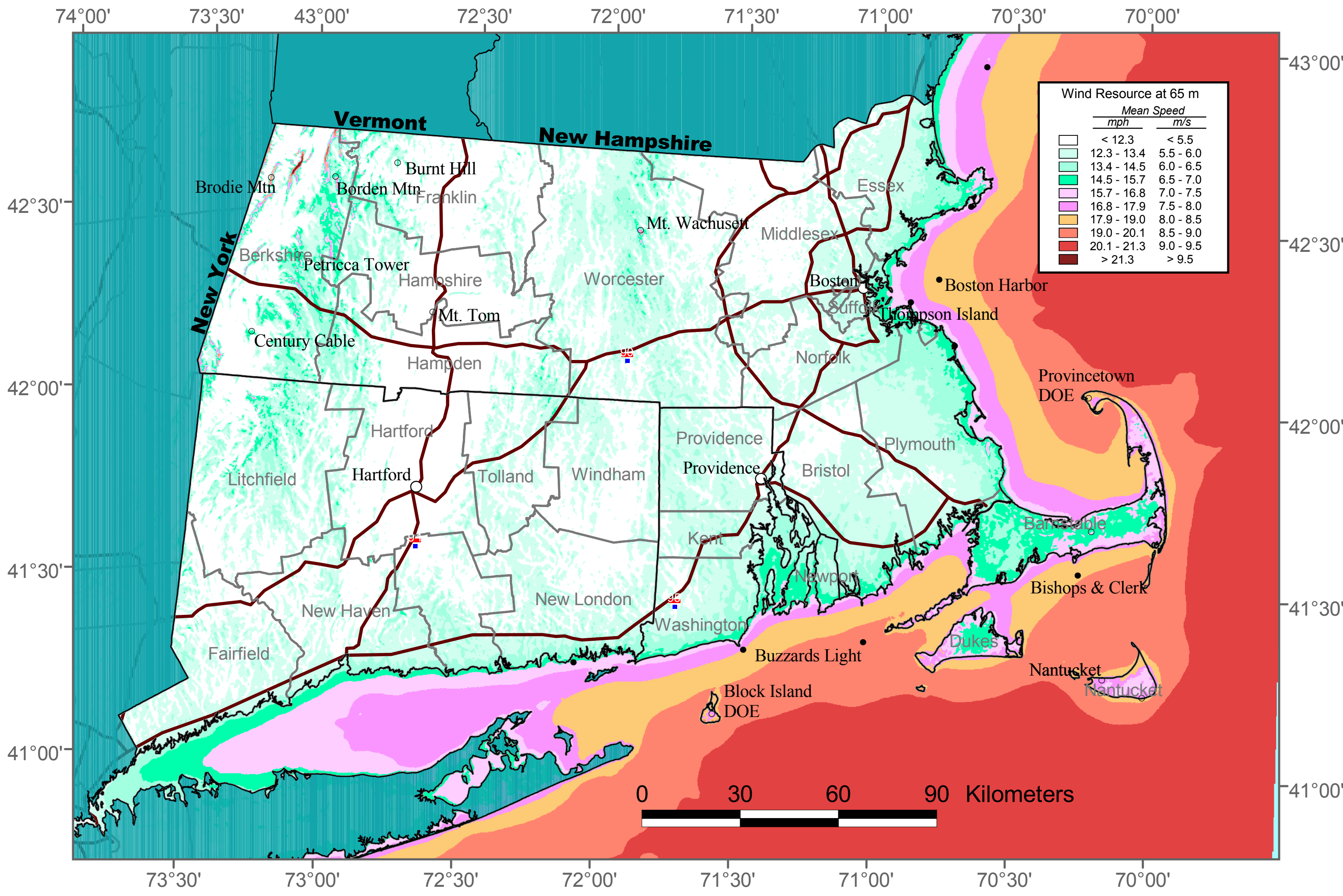
Wind Resource Map of Southern New England
30 m Hub Height



TrueWind Solutions

Projection: Universal Transverse Mercator, Zone 19
Spatial Resolution of Wind Resource Data: 200 m
This wind resource map was created by TrueWind Solutions using MesoMap. It has been validated by the National Renewable Energy Laboratory using available wind measurements. Although the map is believed to present an accurate overall picture of the wind resource, estimates for any particular location should be confirmed by measurement.

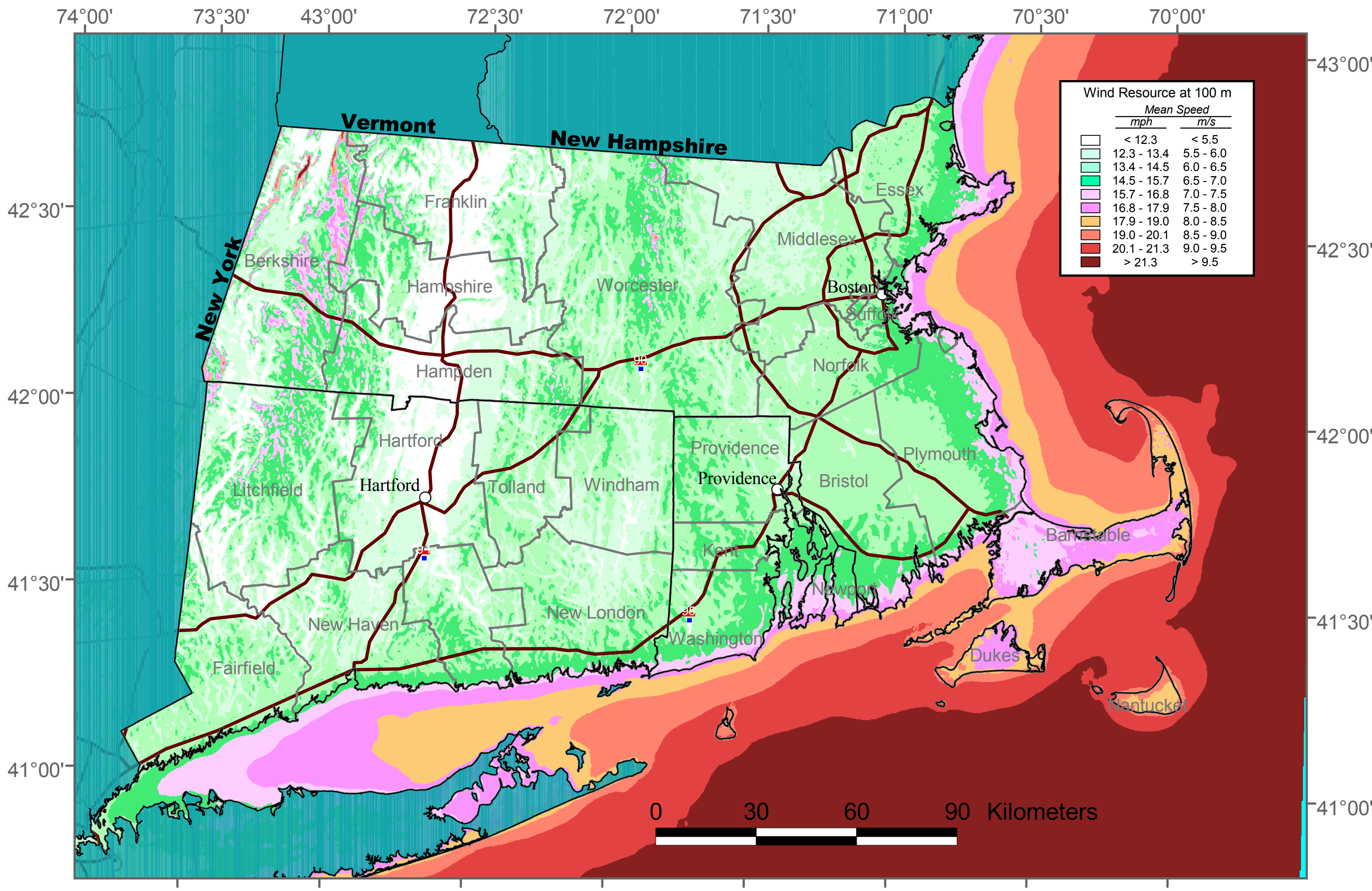
Wind Resource Map of Southern New England
65 m Hub Height



Projection: Universal Transverse Mercator, Zone 19
Spatial Resolution of Wind Resource Data: 200 m
This wind resource map was created by TrueWind Solutions using MesoMap. It has been validated by the National Renewable Energy Laboratory using available wind measurements. Although the map is believed to present an accurate overall picture of the wind resource, estimates for any particular location should be confirmed by measurement.

TrueWind Solutions

Map 3. Wind Resource Map of Southern New England
100 m Hub Height



TrueWind Solutions

Projection: Universal Transverse Mercator, Zone 19
Spatial Resolution of Wind Resource Data: 200 m
This wind resource map was created by TrueWind Solutions using MesoMap. It has been validated by the National Renewable Energy Laboratory using available wind measurements. Although the map is believed to present an accurate overall picture of the wind resource, estimates for any particular location should be confirmed by measurement.

4. Potential Energy Production

The energy production from any wind turbine is a function of the swept area of the turbine's blades, the size and efficiency of the mechanical system, and the aerodynamic efficiency of the blades. These factors combine to determine values for an individual machine's 'capacity factor' (the percent of time the machine can be thought of as running at its full rated output over the course of the year). When multiplied by the number of hours in a year (8,760), this allows us to produce an 'energy curve' for individual machines, which shows the overall energy output in KwHrs/yr at given annual average wind speeds.

While various machines will operate at slightly better or worse capacity factors, in general they will fall within a range of values which can be used to illustrate the amount of power from various standard size turbines. This allows the owner to see how much electricity could be produced by different sized machines at various heights.

The following table represents the potential energy output of a range of mid-scale machines that are typical for commercial/industrial applications:

Hub Height	**Wind Speed m/s (mph)**	**Typical Turbine Size***	**Energy Curve (Output - KwHrs/yr)**
30 meter	5.25 (11.5)	100 Kw	175,000
		250 Kw	320,000
		600 Kw	1,090,000
65 meter	6.25 (14.0)	100 Kw	225,000
		250 Kw	500,000
		600 Kw	1,550,000
100 meter	6.75 (15.1)	100 Kw	275,000
		250 Kw	600,000
		600 Kw	1,800,000

Table 2 (* Micon 108 or Northwind 100, EMS 250, Turbowinds T600)

Note: the wind speeds and turbine output values represented in this report should be taken as rough estimates and should in no way be interpreted as a guarantee of the average annual wind speed or the average annual output of any specific turbine at this site.

5. Use of the Power and Configurations of the Application

Based on a current electric bill, the building currently constructed and occupied by the owner uses 50,041 KwHrs/yr. The average demand charge over the year is for 17.2 Kw of power.

It is important for the land owner to understand how the interconnection of a wind generator can affect the economics of the installation so that the proper sized unit can be installed. The economics of wind power are maximized by several factors:

- The swept area of the rotor. Generally, larger machines benefit from economies of scale, and produce more power per installed dollar.

- The installed cost, which includes permitting and engineering costs related to regulatory issues and public resistance through the zoning laws. Many projects which propose the largest turbines are the hardest (and costliest) to get approved, simply because of resistance from the neighbors or a restrictive zoning law.

- How the turbine is connected to the load use and how excess power is conserved, sold or wasted. The most popular types of service configurations include:

  - **Behind the Meter** – the turbine generator is simply used to service the on-site load, and displaces electricity drawn from the grid. The turbine is carefully sized so that there is little excess power produced, because any such power is wasted. This is typically found in areas where the following options are not available.

  - **Merchant Power** - where the power is generated for sale to the 'grid' and sold at a wholesale rate. This is typically done on larger wind farms, rather than servicing local point loads. In New England, this rate is about $.06 per KwHr, which is the ISO's 'avoided cost'.

  - **Net Metering** – the most popular and profitable approach. In net metering, the turbine is connected 'behind the meter' but the power company regulations allow excess power to 'run the meter backward' (or the site is dual-metered). This typically results in the highest financial benefit, since the full retail cost for delivered power from the power company is displaced by power from the turbine.

New energy laws in Massachusetts made to promote renewable energy sources such as wind power have recently increased the allowable net metered generation size from 60 Kw to 2 Mw, but final rule making from the DPU on this process is not expected to be complete for another 6-12 months from this writing.

Net metering can take the form of 'physical' or 'virtual' metering. In physical net metering, the wires actually run through the facilities and their meters. With virtual net metering, the generator is hooked up directly to the grid and its output metered. The power output is handled more as a billing exercise, where the customer could 'assign' the excess power to other meters within the local distribution company's service area. These meters could presumably be owned by the turbine owner, or could be friends or other neighbors, with whom some financial arrangements could be made for the sale of excess power.

For planning purposes at this site, it is noted that the DPU is expected to mandate and enforce rules for the new energy bill's provision of 'virtual net metering'. In the event this does not occur, some physical net metering to neighboring buildings may also be an option, as long as the cost of distribution (poles and wires) is not prohibitive. The energy bill also includes a 'neighborhood net metering' provision. This has been erroneously interpreted by many to include commercial sites, but actually pertains only to residential neighborhoods.

The above is mentioned to illustrate the fact that when judging the desired size of a wind turbine, it is not simply a matter of 'how big of a machine will fit on the land'. Rather, it becomes a balancing act between trying to find the right sized machine for the site which balances all concerns. For instance, smaller mid-scale turbines (65 Kw – 400 Kw) may ultimately be more cost effective if they are easier to permit (because of their smaller size and usually lower towers) than a larger machine, even if all of the power could be absorbed behind the meter.

This report assumes that the most advantageous method of connection and use of a wind turbine at this site would be a 'virtual net metering' application, with the majority of the power absorbed by the on site load, and the excess assigned to other meters, either in the owners name or perhaps neighbors/friends with whom deals can be made. Therefore, the largest turbine that could be accommodated physically on the site should be utilized, within the constraints mentioned above regarding permitting issues.

6. Potential Savings/Value

Under the assumed virtual net metering arrangement, the current retail cost of the power as delivered from the utility can be considered to be the value of the power produced by the turbine, since this power is directly displaced. The current price being paid for power by the owner is ($1,136.02 / 5956 Kwhrs =) $.191/Kwhr. Because there is a step-scale demand charge in the owner's rate structure however, the effective rate might be slightly lower depending on actual energy usage, and is estimated to be about $.185/Kwhr for energy produced by a turbine generator.

There are other valuable considerations for wind generated electricity. The value of Renewable Energy Credits (RECs) or 'Green Tags' as they are often called, should not be overlooked. In the New England ISO market, RECs are currently trading at around $.055/Kwhr, and this value is expected to stay strong for the next 5-10 years, since the region does not have much 'green' power generation. RECs generally have a life of 10 years, and can be sold to many companies looking to 'buy' their way into being green through the purchase of these vehicles from many power brokers. The sale of RECs would bring the effective rate of power produced by the turbine to about $.24/KwHr.

Another consideration, which is relatively new to the New England market, is the sale of production capacity on the Forward Energy Market auctions through ISO New England. Although this is something that the owner should look into, it will not be considered part of the economics of this report, since the values varies depending on the auction price.

Other valuable considerations which affect the effective rate of produced power from a Wind system in Massachusetts are:

- **The Small Wind Systems Tax Credit**
  Description: Under present law, a federal-level investment tax credit (ITC) is available to help consumers purchase small wind turbines for home, farm, or business use. Owners of small wind systems with 100 kilowatts (kW) of capacity and less can receive a credit for 30% of the total installed cost of the system, not to exceed $4,000. For turbines used for homes, the credit is additionally limited to the lesser of $4,000 or $1,000 per kW of capacity.
  Current Status: The ITC, written into law through the Emergency Economic

Stabilization Act of 2008, is available for equipment installed from October 3, 2008 through December 31, 2016.

- **The Production Tax Credit (PTC) Extension**
  In October 2008, Congress acted to provide a one-year extension of the Production Tax Credit through December 31, 2009
  Description: Under present law, an income tax credit of 2.1 cents/kilowatt-hour is allowed for the production of electricity from utility-scale wind turbines. This incentive, the renewable energy Production Tax Credit (PTC), was created under the Energy Policy Act of 1992 (at the value of 1.5 cents/kilowatt-hour, which has since been adjusted annually for inflation).

- **Local Property Tax Exemption for Residential, Commercial, and Industrial Installations of Solar, Wind, and Hydroelectric Energy Systems**
  Solar and wind energy systems and devices installed for supplying the energy needs of a residence or business are eligible for an exemption from local property tax. This exemption, which is good for 20 years from the date of system installation, applies only to the value of the renewable energy equipment reflected on the property tax bill, not the full amount of the bill.

- **State Corporate Income Tax Deduction for Purchases of Solar and Wind Energy Systems and Equipment**
  Businesses that purchase a solar or wind energy system are allowed to deduct from net income, for state tax purposes, any costs incurred from buying, installing, and operating the unit, provided the installation is located in Massachusetts and is used exclusively in the trade or business of the corporation. The exemption is in effect for the length of the system's depreciation period.
  M.G.L. c. 63, sec. 38H(f)

- **State Corporate Excise Tax Exemption for Purchases of Solar and Wind Energy Systems and Equipment**
  Businesses that purchase a solar or wind energy system are allowed to deduct from net income, for state excise tax purposes, any costs incurred from buying, installing, and operating the unit, provided the installation is located in Massachusetts and is used exclusively in the trade or business of the corporation. The exemption is in effect for the length of the system's depreciation period.
  M.G.L. c. 63, sec. 38H

- **Rapid Depreciation**
  Double-declining balance, five-year depreciation schedule (I.R.C. Subtitle A, Ch. 1, Subch. B, Part VI, Sec. 168 (1994) (accelerated cost recovery system)) is another federal policy that encourages wind development by allowing the cost of wind equipment to be depreciated faster.

Production Output:

Although the various incentives and programs shown above will affect the overall financial pro-forma of any ownership model in a positive fashion, it is beyond the scope of this appraisal to provide such a proforma for any specific machines. Instead the report appraises the value of the potential wind site using the simple effective rate of power mentioned above, *which is $.24/Kwhr.*

At this price, Table 2 in section 4 can be re-displayed to show the typical value of the electricity produced by the representative turbines at this site as follows:

Hub Height	**Wind Speed m/s (mph)**	**Typical Turbine Size***	**Energy Curve (Output - KwHrs/yr)**	**Estimated Value (Savings) in $/yr**
30 meter	5.25 (11.5)	65 Kw	92,000	$21,080
		100 Kw	175,000	$42,000
		250 Kw	320,000	$76,800
		600 Kw	1,090,000	$261,600
65 meter	6.25 (14.0)	65Kw	142,000	$32,080
		100 Kw	225,000	$54,000
		250 Kw	500,000	$120,000
		600 Kw	1,550,000	$372,000
100 meter	6.75 (15.1)	65 Kw	160,000	$38,400
		100 Kw	275,000	$66,000
		250 Kw	600,000	$144,000
		600 Kw	1,800,000	$432,000

Table 3 (* Micon 108 or Northwind 100, EMS 250, Turbowinds T600)

Typical Installed Costs of Systems:

Given the estimated production value of the site, we may now compare this to the estimated costs of today's wind turbines in order to gage economic return on the investment. The table below lists a range of installed wind turbine costs that are being experienced in the region. Two cost values are provided – a Hi and a Low value – due to the many variables regarding this site that would factor into a final price (foundation design, soil geotechnics, power interconnection methods, etc.). A full feasibility study would answer many of these issues in order to help tighten up the cost estimate.

In the lower end of size ranges both new and remanufactured turbines are available. Most rebuilt machines are available with warranties that meet or exceed those of new machines.

Typical Turbine Size	**Value Type**	**Typical Installed Cost ***	**Simple Payback (Simple ROI)****
65 kW*	Low	$120,000	5.7 yrs (17.6%)
65 kW*	High	$140,000	6.6 yrs (15.1%)
65 kW	Low	$220,000	10.4 yrs (9.6%)
65 kW	High	$260,000	12.3 yrs (8.1%)
100 kW*	Low	$190,000	4.5 yrs (22.1%)
100 kW*	High	$230,000	5.5 yrs (18.3%)
100 kW	Low	$430,000	8.0 yrs (12.6%)
100 kW	High	$480,000	8.9 yrs (11.3%)
250 kW	Low	$755,000	6.3 yrs (15.9%)
250 kW	High	$900,000	7.5 yrs (13.33%)
600 kW	Low	$1,800,000	n/a
600 kW	High	$2,100,000	n/a
900 kW	Low	$2,465,000	n/a
900 kW	High	$2,700,000	n/a
1.5 mW	Low	$3,750,000	n/a
1.5 mW	High	$4,200,000	n/a

Table 4
Note: these prices are representative only, and are NOT a quotation.

*Indicates Re-manufactured machines, which are available at these sizes. New machines estimated at 65 meter tower. Remanufactured machines available on 30 m towers.

**Simple payback and simple ROI are useful only for comparison between machines. Does not include costs of O&M, service, financing, grants, tax credits, etc. A more complete proforma is usually included in full feasibility studies.

7. Concerns

The following concerns are offered as issues that should be investigated more thoroughly in a full feasibility study before any wind project is undertaken.

Land Area – The land at XXXXXXX owned by this owner consists of two parcels, of XXXX and XXXX acres. The prospective locations of any turbine would be located on the larger parcel. The town of Plymouth has 2 zoning bylaws regarding wind energy systems: section 205-27, which deals with systems that do not primarily sell power to the utility, and section 205-73, which is designed for larger, 'utility-scale' turbines that do sell a majority of their power to the grid. Section 27 is the less onerous of the two sections, and if permitting can be achieved using this bylaw, it is recommended. However, it has a tower height restriction of 100', and a maximum rotor diameter of 35'. Either section will require a special permit process. Section 205-73 has a minimum lot size requirement of 5 acres. Therefore, it would appear that enough land exists to meet the minimum lot requirements of the bylaw which would probably be applied.

Siting Locations – Reference is made to Diagram 1 which shows the approximate locations of several 'clear zones', within which a turbine must land if it ever was to fall over (considered to be a very archaic rule). Due to the irregular shape of the land, the maximum clear zone that can be fully contained within the property lines (thus removing the need for any easements) is about 300' in diameter. This would lead to a total machine height of 45.7 meters, or 150 feet, including the blade length. Since a 250 Kw size machine has a blade length of about 45', this would appear to limit any tower to a 30 meter, or 100' height. *This would appear to be a limiting factor to this site.*

It should be noted that the possibility exists to allow the turbine site to extend over the pond which abuts the property, using the pond area for additional clear zone (site C or E in Diagram 1). However, the wind bylaw is relatively new and the ability to do this is untested. The pond is about 24 acres in size, and therefore considered a public property or great pond. It is believed that while the legal attempt could be made, this would also open up the potential for legal challenges to the permit. Another possibility is to obtain easements from neighbors for the clear zone, thus allowing taller turbines.

(Please note that these circles in Diagram 1 do NOT represent the blade diameters, which are only 62', 91' and 157', respectively)

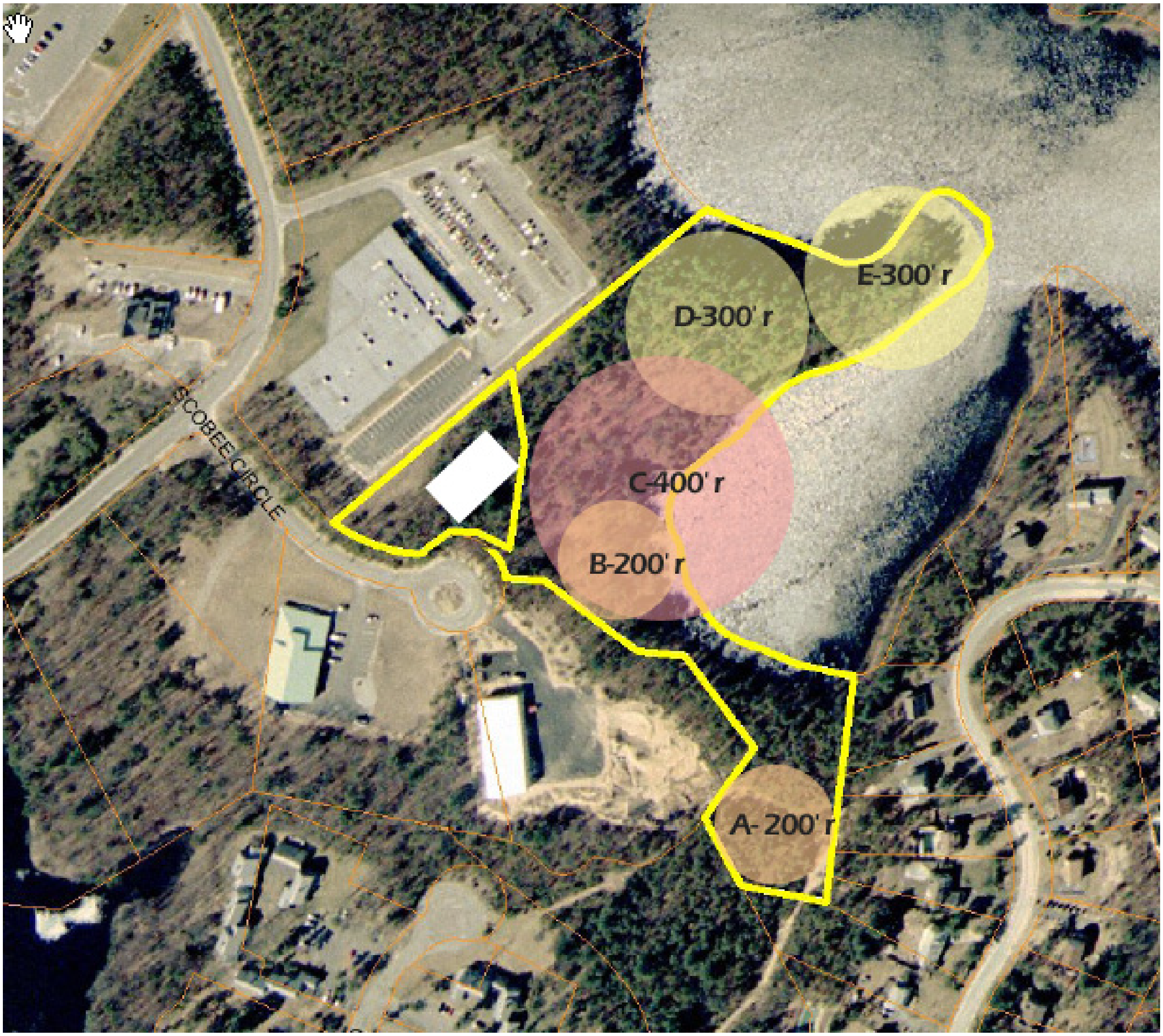


Diagram 1

Another siting concern is the location of residential properties that abut the subject property. The residences at site A would be within 600′ of a machine, and both noise and flicker would need to be demonstrated not to be a nuisance. The residences across the pond appear to be far enough away from the sites, but flicker studies and balloon tests will be required by the bylaw anyway.

General Noise Issues - Noise considerations generally take two forms, state regulatory compliance and nuisance levels at nearby residences:

A. *Regulatory compliance:* Massachusetts state regulations do not allow a rise of 10 dB or greater above background levels at a property boundary (Massachusetts Air Pollution Control Regulations, Regulation 310 CMR 7.10). In most cases modern turbines are quiet enough to meet these criteria easily. Mid-scale turbines, while slightly noisier due to increased tip speeds, are also normally masked by the sound of the rushing wind.

The town of Plymouth has more strict noise requirements. Section 205-27 states that the noise from a turbine cannot be more than 5 decibels above the ambient reading. Section 205-73 states that the noise must not exceed 60 db as measured from the nearest property line, and that this measure will be presumed to have been met by a 600′ setback.

B. *Human annoyance:* Aside from Massachusetts regulations, residences must also be taken into consideration. Any eventual wind turbine would need to be sited such that it would be inaudible or minimally audible at the nearest residences.

Specific Environmental Permitting - Each of the sites must adhere to any rules and regulations pertaining to wetlands and other environmentally sensitive issues.

General Airspace Issues- The form "7460-1 - Notice Of Proposed Construction or Alteration" must be filed with the Federal Aeronautics Commission (FAA) before construction of any structure over 200 feet (i.e. all utility-scale wind turbines). The corresponding form for the Massachusetts Aeronautics Commission (MAC form E10, Request for Airspace Review) must also be filed.

While the response of the FAA or DOD cannot be predicted, most sites that are not within about 3-5 miles of a public or military airport are not considered a hazard to air traffic. At this preliminary stage, we simply examine fatal flaws by considering the distance to public and other runways. The FAA requires that any structure over 200′ be lit. All utility-scale wind power installations are lit. Mid-scale machines are lit on a case-by-case basis.

Specific Airspace Issues - The Plymouth Municipal airport is approximately 2.4 miles from the subject property. Filing the FAA 7460-1 is required and is recommended anyway. Since no military airports are in the vicinity, the DOD is not likely to have any concerns about the site. The use of lighting on mid-scale machines would probably be required, but it is suggested that a confirmation of this fact be obtained from the FAA or Plymouth airport as part of the permitting process.

8. Conclusions/Next Step

The subject property has enough wind to be considered a commercially viable site for a small commercial sized mid-scale turbine. Such a device would produce in excess of $40,000/yr, and make more energy than is needed by the on site operations. Net Metering, either virtual or physical, could be employed to assign excess power to others.

The limiting factor for the site appears to be the irregular shape of the land, which will limit the clear zone that the tower must be situated within. A maximum tower of about 120′ to the hub height, plus the approximate 30′ length of the blades of a 100 Kw turbine, would fit within the 300′ diameter clear zones that appear to be present on site.

Site Recommendations

Since a small mid-scale machine would appear to be an economical decision for the owner, a more complete Feasibility study for this site as a prelude to the permitting process is warranted.

1. Some legal review needs to be performed relating to the setbacks involved in various sites, specifically those around the pond.

2. It is suggested that mid-scale turbines of 65 – 120 Kw be considered at this site due to load, setback and acreage factors.

Next steps:

Since the site appears to meet the basic requirements of having an adequate wind speed, and an adequate load to create positive economics, we would suggest moving ahead with a more complete engineering and permitting *Feasibility Study*.

The information expressed in this Appraisal has been collected and presented in such a manner as to ‘roll into’ such a Feasibility Study, if the site Appraisal indicated that a Feasibility Study was warranted. It can be thought of as a ‘first phase’ of the next detailed study. In this fashion the owner only incurs further expense for the next level of work if they know that the site is of value as a wind turbine site and it warrants further investigation.

A Comprehensive Feasibility Study will conduct in-depth investigation into permitting issues, utility interconnections and metering availability, and refine other costs and implementation issues. It would contain a complete project proforma financial analysis, and specifics as to the actual turbines suited for the project. This type of study is needed to 'set the stage' to allow both the permitting and financing process to begin, should the owner decide to proceed after Feasibility Study review. The cost for a Feasibility Study is approximately $11,000, including work with the utilities regarding interconnection.

In addition, various grants are available to owners wishing to put up wind turbines, ranging from 10-40% of some installations. DMS offers a grant writing service that will conduct a search of applicable grants and make application to such granting authorities on behalf of the owner, should this service be desired. The typical cost of such a service is $5,000.

9. Our Background

Brian D. Kuhn

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Professional Bio:

Brian Kuhn is the Principal of *Developers Marketing Services* of Plymouth, MA, which offers consulting services and project development expertise in the Renewable Energy and Real Estate industries. His current business activities include the formation of, *Aeronautica Windpower*, a venture for establishing a wind turbine manufacturing facility in Massachusetts.

Brian holds a *Bachelor of Science* degree in '*Renewable Energy Systems and Business'*, from the University of Massachusetts, in Amherst, MA ('77), where he studied under Professor *William Heronemus*, a noted naval architect and world renowned primary investigator for off-shore wind systems. He was a member of a small team of engineers that designed and built the first *UMass Solar Habitat and Wind Furnace* for the Department of Energy. This wind turbine introduced many innovations, including the use of a 3 bladed, variable pitch rotor and the use of a monopole tower – features that are now standard in today's modern wind turbine designs. The *Wind Furnace* turbine is currently heading to a new home at the Smithsonian Institute in Washington.

Mr. Kuhn offers the perspective of over 30 years of product and service development. As *National Solar Specialist* for *Rheem Manufacturing* in the early '80s, he taught hundreds of distributors and dealers across the country how to design and install solar hot water systems. He has had several articles published about solar and wind power. He is a member of the *National Association of Home Builders* and the *Northeast Sustainable Energy Association*. He is also a past member of the *National Association of Realtors*, and is licensed as a real estate broker involved in land procurement and development projects across the Northeast.

Mr. Kuhn currently serves as Chairman for the *Plymouth Energy Committee* (PEC), a volunteer advisory group which reports to the Board of Selectmen of Plymouth, Massachusetts. Brian is the principal author of *'Plymouth 2020'*, a plan which calls for virtually all of Plymouth's Municipal electricity to be produced by renewable sources in time for the town's 400th anniversary.

10. Supplemental Information

For more background information

This report assumes that the reader has some familiarity with wind power technology. If the reader is interested in a 'primer' for the industry, or wants an introduction to these areas, we suggest using the UMass Renewable Energy Labs (RERL's) Community Wind Fact Sheets, which are available on the web at: http://www.ceere.org/rerl/about_wind/.

Additional information on wind turbine technology and general information can be found at:

- American Wind Energy Association, www.awea.org
- Danish Wind Industry Association, www.windpower.org

Use of this report

This report is considered proprietary to the owner, and is intended to be used in consultation with the owner as they develop plans to utilize the wind resource.

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